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JOURNEYS IN NORTH GREENLAND.

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I ASSURE you it was not because I did not wish to come that I have not been here before this. I did wish to get here and have the pleasure and the honour of addressing this the first Geographical Society in the world. But, as your President has just said, one thing or another prevented. I have that pleasure, that honour, to-night. I feel that my subject to-night is one that puts me in sympathy with you and you with me. It is a subject in which the British nation is interested, and in which it has felt the deepest interest for centuries. I feel that I stand here to-night in the focus of centuries-long efforts in the arctic regions, and I believe that I speak within bounds when I say there are no pages in England's history of which she is prouder than those on which are written the splendid efforts of her gallant sons in the region of midnight suns and noonday nights.

It is of course impossible, in the limits of one evening, to cover all the points of interest or meet all the interrogations which occur to a large assembly of intelligent minds in connection with such an attractive subject. I have more ground than is usual to cover, from the fact that I have several expeditions to speak of. What I shall attempt this evening is to give you very briefly, yet I trust clearly, a *résumé* of what I have done thus far in the arctic regions, and a synopsis of what I propose to do in the future; and then, with the assistance of the illustrations which I have, endeavour to give you absolutely accurate and

* Paper read at the Royal Geographical Society, December 6, 1897. Map, p. 235. See also map, *Geographical Journal*, vol. ii. p. 384.

definite ideas of the land, the people, and the real phases of life and work in the northern portions of Greenland.

My arctic work comprises—

1. A summer voyage and reconnaissance of the Greenland inland ice in 1886.

2. A thirteen months' sojourn in Northern Greenland, including a 1200-mile sledge journey across the ice-cap, and the determination of the insularity of Greenland—1891–92.

3. A twenty-five months' stay in North Greenland, including a second 1200-mile sledge journey across the ice-cap; the completion of the study of the Whale sound natives; a detailed survey of that region, and the discovery of the great Cape York meteorites—1893–95.

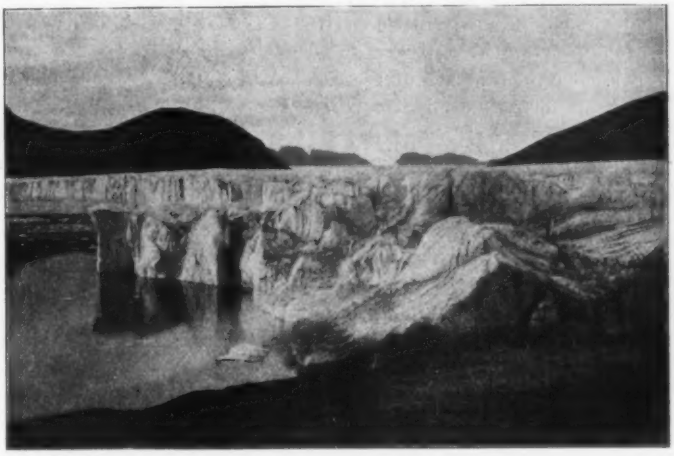
4. Summer voyages in 1896 and 1897, including the securing of the last and the largest of the great meteorites, the 90-ton mass.

Before taking up these expeditions in their order, I will attempt to bring home to you a realistic conception of what Greenland is actually like. Of course we all have a general idea of Greenland, and know that its interior is covered with snow and ice, yet the actual facts are so different from anything existing in lower latitudes, so entirely dissimilar from anything with which we are personally acquainted, and which we might use as a foundation from which to start our conception, that I doubt if one in ten even of the best-read has a true conception of the actuality of this great arctic island continent.

All that there is of land, as we understand the term, in Greenland is simply a ribbon 5 to 25 (and in one or two places 60 to 80) miles in width, made up of mountains and valleys and deep branching fjords; ribbon surrounded by the arctic sea, playground of the iceberg and the pack-ice, and itself in turn surrounding and supporting, like a Titan dam, the great white ice-cap beneath which the interior of the country is buried. When I say this, I am sure most of us immediately think of some particularly mountainous region with which we are familiar, as, for instance, the highlands of Scotland, the Alps or the Pyrenees, covered several hundred feet deep in snow and ice, yet still retaining the original irregularities of the region. Such a mental picture, however, would in no way represent the conditions of interior Greenland. There the accumulated snow-precipitation of centuries, in a latitude and altitude where it is practically correct to say that it never rains, and the snow does not melt even in the long summer day, has gradually filled all the valleys of the interior until it has levelled them even with the mountain summits, and, still piling higher through the centuries, has at last buried the highest of these mountain summits hundreds and even thousands of feet deep in snow and ice.

The interior of Greenland to-day is simply an elevated unbroken plateau of snow lifted from 5000 to 8000 and even 10,000 feet above the level of the sea; it is an arctic Sahara, in comparison with which

the African Sahara is insignificant. For on this frozen Sahara of inner Greenland occurs no form of life, animal or vegetable; no fragment of rock, no grain of sand is visible. The traveller across its frozen wastes, travelling as I have week after week, sees outside of himself and his own party but three things in all the world, namely, the infinite expanse of the frozen plain, the infinite dome of the cold blue sky, and the cold white sun—nothing but these. The traveller, too, across this frozen desert knows that at no time during his journey are the highest rocks of the mountain-summits below him nearer than from 1000 to 5000 feet down through the mighty blanket of snow. Such is the interior of Northern Greenland; and it is upon the surface of this



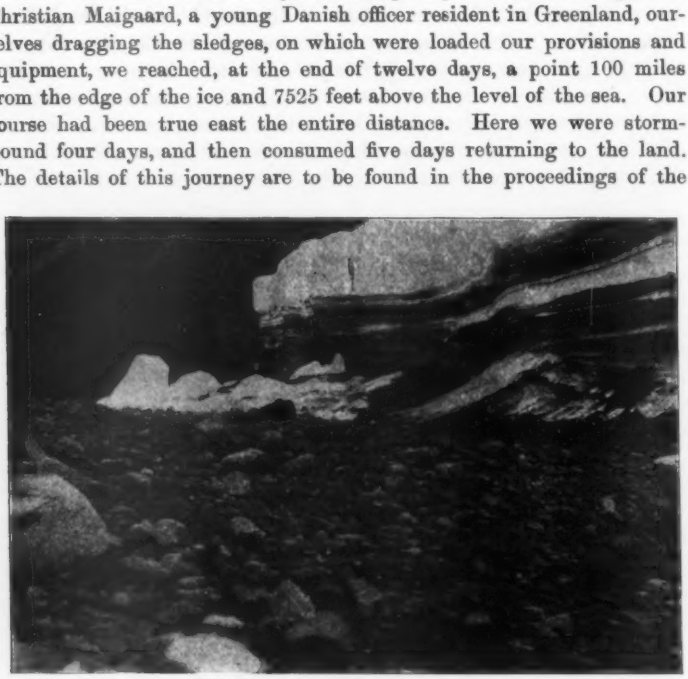
BOWDOIN GLACIER.

uplifted desolation, in nearly straight lines at a constant elevation of from 5000 to 8000 feet above the level of the sea, that my sledge-journeys have been made, in widest contradistinction to the road of the usual arctic sledge-party—the frozen surface of the polar sea, at the sea-level, along and outside of the ragged periphery of an arctic coast-line.

The object of my work in 1886 was to satisfy myself by personal observation as to the actual character of the Greenland inland ice, in regard to which there were conflicting reports. The summer's work covered a voyage from Newfoundland to Disco bay, Greenland; a stay of three months in that country, in which time was effected a reconnaissance of the inland ice; and then two and a half months on a whaler along the west coast of Baffin's bay and Davis' strait. Lack of space compels me to note only the work which was the main object

of the voyage—the reconnaissance of the inland ice—and that in the briefest manner.

This reconnaissance was made from the head of Pakitsok fjord, about the middle of Disco bay. Starting July 5 with one companion, Christian Maigaard, a young Danish officer resident in Greenland, ourselves dragging the sledges, on which were loaded our provisions and equipment, we reached, at the end of twelve days, a point 100 miles from the edge of the ice and 7525 feet above the level of the sea. Our course had been true east the entire distance. Here we were storm-bound four days, and then consumed five days returning to the land. The details of this journey are to be found in the proceedings of the



GNOME GLACIER.

American Geographical Society. I shall note here only the significance of, and results flowing from, this journey.

The elevation reached was greater than that attained by any previous explorer on the inland ice. For the first time the deep, unchanging, incoherent snow of the central plateau was reached, and my upward and return journeys between the land and this interior *névé*, separated as they were by a period of some three weeks, enabled me to present for (to the best of my knowledge) the first time, a clear conception of the different zones and varying conditions existing between the edge of the "Great Ice" and the unchanging snow of the interior.

The characteristics of such portions of the "ice-blink" as came under my personal observation may be stated as follows: The coast-line shows a great diversity of features dependent upon the altitude, the season, and the elevation and configuration of adjacent mountains.

Wherever the ice projects down a valley in a long tongue or stream, the edges contract and shrink away from the warmer rocks on each side, leaving a deep cañon between, usually occupied by a glacier stream; and the upper surface, disintegrated by the reflected heat of the mountains above, and shattered by the daily change of temperature —more, perhaps, than by the outward flow—presents a chaotic labyrinth of crevasses, gullies, and ragged pinnacles, increasing in magnitude in direct proportion to the length of the tongue and its approach to sea-level. Smaller tongues or teats, rounding down into shallow indentations in the crest of the mountain-dam, are apt to leave only their tips ragged, and their upper surfaces covered with a network of narrow

ESKIMO HOUSE-BUILDING.

crevasses. Higher up, along the unbroken portions of the dam, where the rocks have a southern exposure or rise much above the ice, there is apt to be a deep cañon between the ice and the rocks. The bottom of the cañon is almost invariably occupied by water. Where there are no adjacent rocks higher than the ice to push it back with their reflected heat, the ice will reach down upon the rocks in a dome-like slope. Frequently drifts of fine hard snow extend like causeways from ice to rock, through the bases of which the littoral glacier streams tunnel a passage. Still farther up, at the very crest of the dam, the ice lies smoothly against the rocks. As to the features of the interior within the coast-line, the surface of the "ice-blink" near the margin

is a succession of rounded hummocks, steepest and highest on their landward sides, which are sometimes precipitous. Farther in, these hummocks merge into long flat swells, which in turn decrease in height towards the interior, until at last a flat gently rising plain is reached, which doubtless becomes ultimately level.

In passing from the margin of the "ice-blink" to the remote interior, from one to five distinct zones may be noted, the number and width varying with the season, the latitude, and the elevation. In winter the entire surface is undoubtedly covered with a deep unbroken layer of fine dry snow. Late in the spring, the warmth of the sun at mid-day softens the surface of the snow along the lower borders of the ice, and this freezes at night, forming a light crust. Gradually this crust extends up the interior, and with the advance of the season the snow along the borders of the "ice-blink" becomes saturated with water. A little later this zone of slush follows the zone of crust into the interior, the snow along the borders of the "ice-blink" melts entirely, forming pools in the depressions, and streams which cut deep gullies in the ice; water cavities form, old crevasses open, and new ones appear. This zone rapidly widens and extends into the interior in the footsteps of the others, and behind it the immediate border of the ice gets ragged and soiled; pebbles, boulders, and moraines crop out of its melting surface; and by the end of the arctic summer it is eaten and shattered by the heat, and eroded by the streams into impassable roughness.

This journey satisfied me as to the general characteristics of the "Great Ice;" showed me that ideas and theories which I had advanced, previous to undertaking the voyage, were in the main correct; impressed upon me that the inland ice presented an "imperial highway" by means of which to reach and determine the northern extension of Greenland, a problem which your distinguished President has characterized as second only to the attainment of the pole itself; gave me an invaluable fund of actual personal experience; enabled me to formulate a general plan for the complete exploration of Greenland; and laid the foundation for the persistent and systematic attacks which I have made and shall still make upon the unknown portions of Greenland and the adjacent lands to the north.

Returning from this voyage, I prepared three or four desirable routes for overland sledge journeys, which should complete our knowledge of Greenland:—

1. For the simple purpose of accomplishing the feat of crossing Greenland—the route from the south-east angle of Disco bay to Cape Daw (this route was attempted two years later by Nansen, but, deflected by hostile conditions, he effected a crossing much farther south on a shorter route).

2. For the purpose of obtaining a transverse profile of Greenland—

the route from the base of Nursoak peninsula to the head of Franz Joseph fjord.

3. For the purpose of determining the northern extension of Greenland and completing the gap in its northern and eastern coast-line—a route from Whale sound parallel with the north-west coast to the northern terminus (this journey was accomplished by me five years later).

Returning from the voyage of 1886, the demands of the service kept

ESKIMO WOMAN, WHALE SOUND.

me fully occupied for five years. At last, in 1891 I found the opportunity of carrying out my constantly cherished project of a march from Whale sound across the inland ice of Northern Greenland to the northern terminus of that country, and the result was the North Greenland Expedition of 1891 and 1892.

The main object of this expedition was the determination of the northern limit of Greenland, and its fundamental feature was the utilization of the surface of the interior ice-cap as my highway to the objective point. My party comprised seven persons: Dr. F. A.

Cook, Langdon Gibson, John M. Verhoeff, Eivind Astrup, Matthew Henson, Mrs. Peary, and myself. My programme was to proceed in my ship to Whale sound, winter there, start early the next spring, make my northern journey over the ice-cap, and return to my winter quarters the same season. This programme was carried out on schedule time, in spite of the serious handicap resulting from the breaking of both bones of my right leg on the upward voyage, my landing a helpless cripple strapped to a plank, and my consequent incapacitation for serious exertion during the remainder of the first season. Again lack of space compels me to note only the ice-cap journey, and that very briefly.

The start was made on the last day of April, 1892. Two weeks of hardest work were consumed in transporting my supplies across the succession of great ice-domes intervening between the coast-land ribbon at the head of McCormick bay and the true inland ice. I had with me three of my party, Mr. Cook, Astrup, and Gibson, and sixteen dogs. My course was north-east true, which, assuming the charts to be correct, should enable me to clear the heads of the Humboldt, Petermann, and Sherard Osborn indentations. Advancing on this course, much to my surprise, I found myself almost immediately over the divide, at an elevation of somewhat less than 5000 feet, and gradually descending toward the Humboldt glacier basin. Hardly had I lost sight of the Whale sound land before the distant peaks of the Rennselaer harbour coast rose into view. After a gradual descent to an elevation of about 3500 feet, the surface of the ice became nearly constant as to elevation across the Humboldt glacier plateau.

On May 24, at a distance of 130 miles from McCormick bay, all my boys having volunteered to accompany me, I selected Astrup as my companion for the long journey, and Gibson and Cook returned to Redcliffe. Two marches beyond this we began climbing again, and on the last day of June had passed out of the Humboldt depression, and from the plateau south-east of Petermann, at an elevation of 4200 feet, looked down upon the head of that fjord and the great glacier discharging into it. Still ascending, we reached the divide at an elevation of 5700 feet, June 5, and then began descending into the St. George's and Sherard Osborn depressions. Unfortunately, the next two marches were made in cloudy weather, and I got too deeply into the depression and too near the centre of ice-movement. As a result, about ten days were lost in getting out again and back on to the crevasse-free level heights farther inland.

Again setting my course to the north and north-east, everything went smoothly for several days. We climbed gradually and easily over the highest divide we had yet encountered—something over 6000 feet in elevation—and were descending slightly towards the north-east, when, on June 26, in lat. 82° 12′ N., I was discouraged to see the land which

had been occasionally visible to the north-west rise into view north and north-east. Advancing a short distance farther, the entrance of a large fjord came into view in the north-west, and soon after the land rose into view north and north-east, with the depression of the fjord beyond it. I then deflected my course to the east, and soon found the land, and the fjord beyond it, again confronting me; deflecting still more, this time to the south-east, I advanced until July 1, when a broad break in the land beyond the fjord was visible

ESKIMO YOUNG MAN, WHALE SOUND.

opening out to the north-east, and I immediately made for the land, with the intention of reaching this opening. After reaching the inner edge of the land-ribbon, where the inland ice came down against the slope of the mountains at an elevation of about 4000 feet, we were obliged to travel some 25 miles over the mountain crests and ridges before reaching a summit which gave us an unobstructed outlook over the great bay stretching out to the north-eastward. These 25 miles, over a surface consisting of sharp rocks of all sizes, were extremely trying to Astrup and myself. The fatigue of climbing

with our heavy packs and hampered by the dogs, which we were obliged to take with us, was greatly increased by the enervating effect of what was to us an almost tropical temperature, accustomed as we had been to the clear, cold, searching atmosphere of the inland ice. When, however, we reached at last the summit of the great bronzed cliff, some 3500 feet in height, guarding the head of the great bay, we forgot all our fatigue in the grandeur of the view before us. To our right, across a great glacier, rose other vertical bronze cliffs 4000 feet or more in sheer height, and ending in a wild promontory. Northward and north-eastward stretched a bold, bluff, red-brown line of shore, the nearest portion of it surmounted by an ice-cap of limited extent, but the more distant portions free of all cresting ice-cap and of snow. To our left lay the depression of the fjord which had barred our passage, and still further to the northward we could make out the entrance of a second fjord, reaching apparently to the north-westward. At our feet, beyond the great fan-shaped face of the glacier, which I estimated to be 20 miles in periphery, were scattered numerous icebergs, prisoned in the still unbroken surface of the bay ice. Beyond this the bay ice seemed perfectly smooth and unbroken, and stretched away uninterrupted to the distant white horizon of the north-eastern arctic ocean. Far out in the centre of the bay I could make out a clouded appearance, undoubtedly due to the formation of water-pools upon the surface of the ice, the first signs of approaching disintegration. Our position was 81° 37′ N. lat., 34° 5′ W. long.

The bay itself I named, in honour of the day on which we first looked down upon it, Independence bay. The great glacier at my right I called Academy glacier; the giant cliff on which we stood, and upon which I afterwards erected my cairn, I named Navy cliff; and the detached land-masses to the north, Heilprin and Melville lands respectively. My equipment was adapted to inland-ice work only, and was too light for the stress of sea-ice work. If I were to proceed further I must descend to the sea-level, with a practical certainty that in a few miles my sledges would be destroyed by the roughness of the sea-ice. Consequently, from that point I turned back.

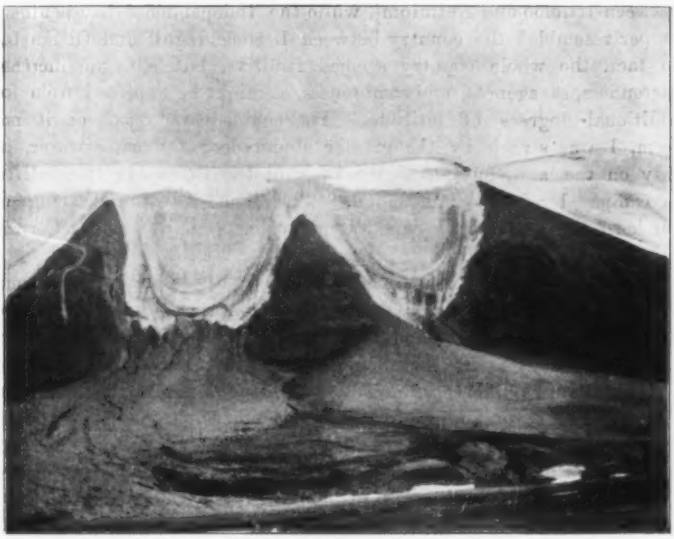
July 7 we were back at the edge of the inland ice, and on the 8th began our uneventful return journey.

As to the character of the northern land-ribbon in the vicinity of Independence bay, paradoxical as it may sound, its appearance, as seen from the heights of the ice-cap, was much less forbidding than that of the Whale sound ribbon seen under the same circumstances. This I judge to be principally the result of local orographical features, but partly also due to the reversion of the point of view.

The northern shores of Whale sound are almost continuously bold, and the plateau above the cliffs is almost completely covered either by tongues of the main inland ice, as in the peninsula between Bowdoin

bay and Inglefield gulf, or by detached ice-caps, as on Redcliffe peninsula, Herbert island, etc., the edges of which in many places are less than a mile from the shore-line. As a result, the traveller, descending from the heights of the "Great Ice," sees only the rolling snow-domes of these tongues and isolated caps, with the crests of the black cliffs intersecting them in irregular lines, until he has almost reached the edge of the ice, and is able to look down into the bays and see the warm and contracted slopes along their shores and the little valleys at their heads.

The Independence bay land, on the contrary, is, though elevated,



FŒTAL GLACIER, MCCORMICK BAY.

rolling and devoid of ice-cap, and broad areas of the red and dark brown land surface meet the eye. Another thing in favour of this region is that it is approached from the front, as it were—*i.e.* from the south—while the other is approached from the back, or the north.

The geological features of the country are practically the same as those of Whale sound, and nearly, if not every, feature of the one region could be duplicated in the other. The lateral moraine of the "Great Ice" in Independence bay contains the same rocks and has the same appearance as that at Bowdoin bay; the level tops of the high mountains and ridges show the same hard, compacted gravel surface (as if formed by a heavy road-roller) that can be seen on the Redcliffe pleateau back of Cape Cleveland. The eastern slopes of Heilprin Land remind me

very strongly of the south-eastern shore of McCormick bay; and the giant cliffs which tower over the Academy glacier, though much higher, resemble strongly those of Academy bay. Dark granite and gneissose cliffs and trap-dykes, running in various directions, may be seen here as about Whale sound. Wave-marked slabs of red sandstone, identical in colour and size of markings to those I have picked up on the shore of Bowdoin bay, I saw over 3000 feet above the sea on the Independence bay land.

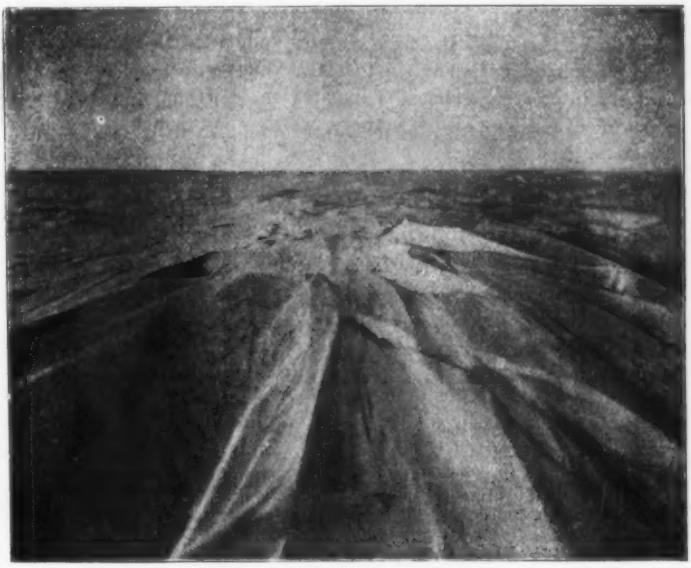
The country east of the Academy glacier, with the dark cliffs surcharged with a continuous ice-dome, would, but for the absence of exuding glaciers, be strikingly similar to the shore of Whale sound, between Ittibloo and Netiulumi, while the Independence bay peninsula proper resembled the country between Inglefield gulf and Olriks bay. In fact, the whole country seemed familiar, but with an increased barrenness, savageness, and sombreness, as might be expected from four additional degrees of latitude. Yet again, paradoxical as it may seem, I was struck by the greater abundance of flowing water, not only on the land, but along the edge of the ice-cap in this latitude as compared with Whale sound. The zone of wastage along the northern edge of the ice-cap was as wide as it was at McCormick bay.

The Academy glacier, while showing in its upper portion and around the circumference of its great *névé* basin features similar to those of the glaciers of Jacobshavn and Tossukatak in Disco bay, and the Heilprin and Tracy glaciers in Inglefield gulf, in its lower portion showed peculiar features like those noted by Dr. Coppinger in the Petermann glacier. For several miles from the extremity of the glacier the ice-stream is intersected by great vertical-walled canals, in which the water has frozen many feet below the glacier surface. As may be imagined, the discharge of the glacier is controlled by these canals, and instead of fragments of ice and icebergs, as we understand them, great fields of the glacier, miles in extent, are detached and gradually move out into the bay.

The uniformly smooth surface of the bay ice might be accounted for in two ways: either on assumption that the ice did not break up every year, and that the combined effects of partial surface melting in summer and the drifting snow of spring and fall would smooth all irregularities; or that it does break up, and the moment it is loosened is driven out to sea by the wind, which is always blowing out of the bay. The absence of icebergs in the bay, except near the end of the glacier, inclines me to the latter idea. Small lakes and ponds are numerous over the land, and rushing brooks in summer-time are everywhere. The presence of nearly continuous sharply marked tumuli and embankments of moraine material, miles in advance of the present edge of the "Great Ice," indicate more clearly than I have noticed anywhere to the

south, the undoubted retreat of the ice from a considerable area of terrene.

During our traverse of this northern land I found flowers of numerous varieties blooming in abundance, conspicuous among them the ever-present arctic poppy. Snow-buntings, two or three sandpipers, a single gerfalcon, and a pair of ravens were observed. Two bumble-bees, several butterflies, and innumerable flies were also noted. As for musk-oxen, their traces are to be found on every mountain and in every valley; without making any search whatever for them, we saw about twenty, and all these could have been obtained without the least difficulty.



SASTRAGI OF THE INLAND ICE.

Bearing more to the south into the interior, in order to avoid the obstacles near the coast, the crevasses and steep slopes of the glacier basins, in four marches we were on the great central plateau, cloud-capped and deep with snow. Here, at an average elevation of about 8000 feet, we travelled for two weeks; then, bearing to the westward, came down to the 5000-feet level east of the Humboldt glacier, and thence parallel to the outward route to the head of McCormick bay. Just before midnight of August 5 we met Prof. Heilprin and his party some ten miles from the edge of the ice, and early in the morning of Saturday the 6th we touched the shore of McCormick bay. I had five dogs remaining.

A carefully studied feature of my project was the entire dependence upon the game of the Whale sound region for my meat-supply; and though I took an abundance of tea, coffee, sugar, milk, corn-meal, and evaporated fruits and vegetables, my canned meats were only sufficient to carry us over the period of installation, with a small supply for short-sledge journeys. In this respect, as in others, my plans were fortunate of fulfilment, and we were always well supplied with venison. With fresh meat and fresh bread every day, we could smile defiance at scurvy.

The accident to myself on the upward voyage, and my consequent incapacity for work during the season of 1891, was a serious blow to me, destroying, as it did, my opportunities for geographical work in the neighbourhood of Redcliffe House, and, what I regretted most keenly, rendering it impossible to make velocity measurements of the extremely interesting glaciers of that region. Fortunately, the accident did not affect the long sledge journey, which was the main object of the expedition.

The principal geographical results of the expedition may be briefly summarized as follows:—

The determination of the insularity of Greenland, and the delineation of the northern extension of the great interior ice-cap.

The determination of the existence of detached land-masses of less extent to the northward.

The determination of the relief of an exceptionally large area of the inland ice.

The delineation of the unknown shore of Inglefield gulf, and the imperfectly known shores of Whale and Murchison sounds. The variance of existing charts from the real configuration of this region is so great, that I found it difficult to locate satisfactorily the names appearing upon the charts. I have, however, retained all these names, and I think that in future there will be no difficulty in distinguishing them.

The discovery of a large number of glaciers of the first magnitude.

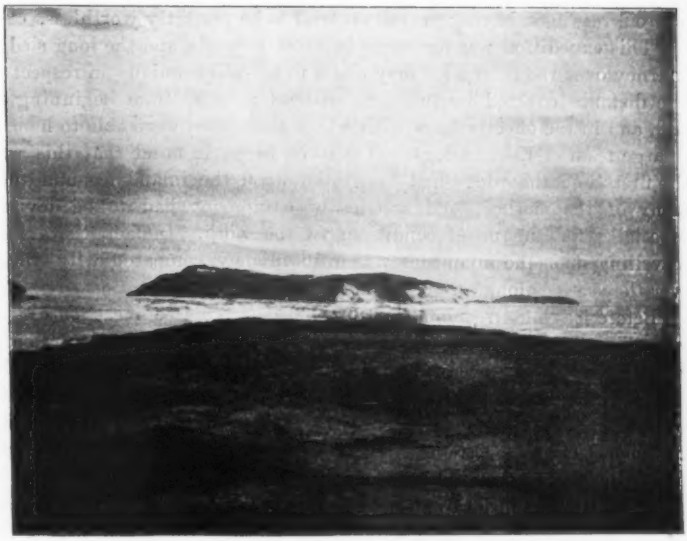
In the field of ethnology, the expedition can claim to be the first that obtained complete and accurate information of the peculiar and isolated tribe of arctic highlanders. Dr. Cook made a complete census of the little community of Smith sound Eskimo, showing the relationship and approximate age of every man, woman, and child in the tribe. The total, according to this census, is 233. He also made anthropometrical measurements of seventy-five individuals, and with his assistance I took a complete series of photographs of the same individuals, comprising portrait, and front, side, and rear elevations in the nude of each subject.

The meteorological and tidal observations by Mr. Verhoeff are among the most complete and painstaking ever made in the arctic regions. An independent set of four hourly tidal and weather observations, kept by

each officer of the watch, will prove of value in connection with the above.

As regards geographical methods during the traverse of the inland ice, my daily reckoning was kept by the compass, and an odometer wheel attached to the rear of the sledge. The circumference of this wheel being a trifle less than 6 feet 1 inch, one thousand revolutions of it made one nautical mile, and the revolutions were registered by the ordinary odometer mechanism.

At four camps on the upward journey and three on the return, not including the observations at Navy cliff overlooking Independence bay,



LITTLETON ISLAND.

this daily reckoning was checked by a complete series of solar sights, taken with a small traveller's theodolite with a special vertical arc of large radius.

The time was obtained from two pocket-chronometers and a high-grade watch, all of which were carefully rated before my departure and after my return, and were compared with each other almost daily during the journey.

That these observations were not taken more frequently was due to the fact that, travelling as we did when the sun was north and sleeping when it was south, the taking of a set of observations meant for me either no sleep at all, or at best but two or three hours of it. That even the field working of my sights was, however, not very far out of

the way may be inferred from the fact that, running on a compass course from my last observation camp, 150 miles north-east of McCormick bay, and supposing myself to be 10 miles to the eastward of my outward course, I found myself, on reaching the head of McCormick bay, but 5 miles to the eastward; in other words, I was 5 miles out in my reckoning.

The freedom of the inland ice from all local attraction, and the consequent reliability of the compass, if its constantly changing declination be carefully watched, is of great assistance to the traveller.

Elevations were determined by aneroids only, a special boiling-point apparatus, which I had ordered for the purpose of checking the aneroid readings, having proved on trial to be perfectly worthless.

This expedition was fortunate in most respects, and the long sledge journey over the inland ice may claim to be called unique in respect to the distance covered by two men without a cache from beginning to end, and in the effectiveness with which those men were able to handle a large team of Eskimo dogs. It is to be borne in mind that this was the first time that dogs had been used upon the inland ice, and that many of the methods and articles of equipment had to be devised especially for the novel conditions of the work. In fact, the art of travelling upon the inland ice was in its infancy, compared with travel over the sea-ice along an arctic shore-line.

Before leaving Greenland in 1892, I had formulated ideas for carrying my work further, and, returning to the States, succeeded in raising funds for a second expedition, my object being to go again to Whale sound, winter there, and start in the spring of 1894 across the ice-cap to Independence bay with enough men to form two parties, and an equipment suited for travel over the sea-ice, and prosecute my work further north and east of Independence bay. Early in March, 1894, I encountered on the ice-cap a series of blizzards unprecedented in arctic work. A climax came in a three days' storm. During a period of thirty-four hours we had an average wind velocity of 48 miles an hour, as recorded by my anemometer, and an average temperature of $-50°$ Fahr., and a minimum of $-66°$ Fahr., as shown by thermograph. The effect of that weather was to freeze several of my dogs as they slept in the snow. My party, well protected with fur clothing, suffered not seriously, beyond frost-bitten toes and fingers. I pushed on until the "piblockto," or Greenland dog madness, induced by the continued exposure, got such a hold of my dogs as to make it absolutely impracticable for me to go further, and I cached most of my provisions and turned back. I was obliged to cache other supplies on the way back, and finally reached the lodge with my remaining dogs in sad condition, and with my party practically used up.

As a result of this mishap, and the discovery by most of the members of my party that arctic work is not quite a picnic, all of the party,

except Lee and my coloured man Henson, returned in 1894 on the ship which had come up for me. With them returned Mrs. Peary and the little girl who first saw the light in the white north. I with my two companions remained another year. I was seriously handicapped, for the greater part of my material had gone to the first year's work, but I felt, as long as I had the time, that I must make the attempt again. There was a chance that I might succeed. Wintering again, I started once more in the spring of 1895. All my pemmican and alcohol were locked up in the cache, 124 miles from the edge of the ice-cap, so I had to start with ships' biscuit and tea, frozen venison for myself and party, frozen walrus meat for my dogs. Those of you who have had experience in arctic work know what a handicap it is to be obliged to carry

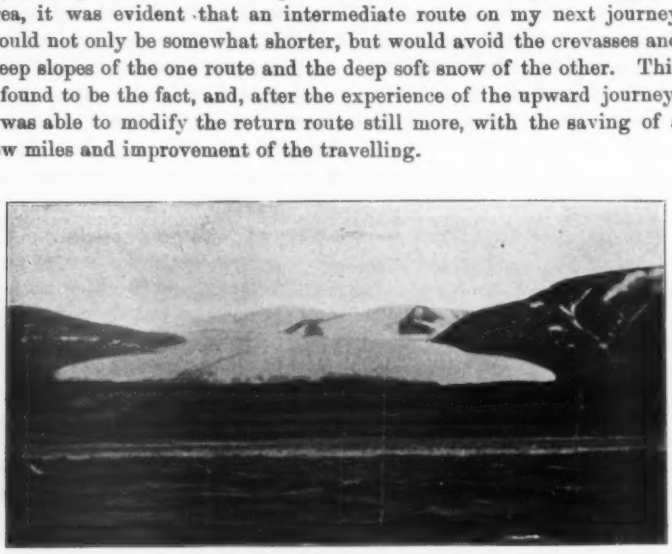
JOSEPHINE HEADLAND.

rations in that shape for your party, 4 lbs. of fresh meat being equivalent to 1 lb. of pemmican. I started on this trip on April 1, and with me, as a result of the confidence I had been able to inspire among the Eskimo, I was enabled to take a supporting party of three of them to accompany me to the cache and return from there alone, while we kept on in the effort to reach Independence bay. I felt I stood an even chance of reaching the bay, and if we did reach it, and musk oxen were in sufficient abundance, we could recuperate, rest awhile, then push on to accomplish something beyond my previous work. The chance was worth taking.

The details of the march to Independence bay it is not necessary to repeat here. When we started on this journey, we knew that we were relying solely upon our own exertions and the Almighty. Whatever fortune, ill or good, awaited us in or beyond the heart of the "Great Ice," whatever accident or mishap befell, there would, there could, be no rescuing party.

During my journey in 1891, in my effort not to make any more easting than was absolutely necessary, I was repeatedly turned from my course by the unexpected penetration of the glacier basins of the

great fjords of the north-west coast of Greenland into the interior, and in this way experienced much delay and annoyance. On my return the same year, I went well into the interior to avoid these obstacles. In this I succeeded. With two routes having the same starting and objective points, and enclosing between them an elongated elliptical area, it was evident that an intermediate route on my next journey would not only be somewhat shorter, but would avoid the crevasses and steep slopes of the one route and the deep soft snow of the other. This I found to be the fact, and, after the experience of the upward journey, I was able to modify the return route still more, with the saving of a few miles and improvement of the travelling.



GLACIER OF THE SCARLET HEART.

The land clouds of the Independence bay region were visible at least 100 miles in upon the ice-cap, gradually rising above the snow horizon as we approached. When we reached what might be called the actual crest of the ice-cap, a point about 15 miles from the edge, where it begins to slope down rapidly to the land, and I could make out the familiar landmarks, I found that we were approaching the land on a course about 5 miles east of that on which I had descended to it in 1892. This difference of position resulted in a higher elevation, enabling me to look over the eastern edge of the Academy glacier basin, and make out the summits of the east coast land-ribbon considerably further to the south than I had seen them in 1892.

At this time it was entirely clear on the ice-cap and along the inner edge of the Independence bay land. Further out was a heavy, hazy stratum, hanging at a considerable elevation over the land, beneath which I saw due north of us, and distant apparently 75 or 100 miles, what had escaped observation owing to the heavy clouds on my previous trip, a magnificent mountain, massive in form and heavily buttressed,

towering in savage grandeur far above the intervening cliffs and ice-caps. Apparently it was twice their height; as, however, its shape was changing under the mirage effects of these high latitudes, it is very likely that its elevation was exaggerated by the same cause. Increasing haziness soon hid it from our view; a few hours later a dull veil formed, entirely blotting out the sky, clouds sank in great leaden masses on to the land; the ice-cap took on a ghastly hue, and short, sharp gusts of wind followed each other in rapid succession down the slopes of the "Great Ice," and the land was reached in the midst of a roaring blizzard from the ice-cap, which confined us upon the moraine for two days.

In 1892 my route from the moraine to Navy cliff had been selected

ON THE GREAT ICE.

with a view to giving me as good an outlook as possible, and I had travelled intentionally along the crest of the mountains which bound the Academy glacier on the west. Now my chief object was to get the sledges to the bay-ice by the easiest practicable route, and this meant following the valleys of the streams, where the greatest amount of snow was to be found, and the grade certain to be more regular and gradual. For this reason, during our work upon the Independence bay land, hunting the musk ox and transporting the sledges and equipment to a point about 10 miles north of Navy cliff, we saw only the slopes of the valleys which formed our road.

The details of our return journey from Independence bay it is not necessary to repeat here. Somewhat recuperated by the liberal rations of musk-ox meat, men and dogs fortunately started on the return

journey in fairly good condition, and were thus enabled to make the ascent of nearly 8000 feet to the crest of the "Great Ice."

From this point on, a practically level surface, the absence of storms, the perfection of our equipment, and the use of every expedient known to the Eskimo, or which our own ingenuity could devise, to decrease the friction of our sledges and increase the tractive force of ourselves and dogs, enabled us to travel at speed from 1½ to 2 miles per hour, and to continue these speeds from ten to twelve hours at a time, depending upon the character of the snow. Any sudden or increased exertion, however, would invariably be followed by bleeding at the nose, and a weakness would compel us to stop and rest. Fortunately for us, no ice-cap blizzard occurred during the return march, and we eventually reached the lodge with all our provisions consumed, and one dog out of the forty-one with which we started at the beginning.

While this journey cannot be said to have added much to the information gained during the previous trip of 1892, it has completed the conquest of the inland ice, and has shown that, with the proper supplies and the right kind of men, Greenland can be crossed with safety at any point in a single summer.

Had the discoveries of the first journey across the ice-cap from Whale sound to Independence bay been combined with the perseverance and the determination under the most serious handicaps of the second journey, the combination would, I believe, have been *facile princeps* among all arctic journeys.

There are numerous points of the utmost interest in connection with the inland ice of Greenland, which the limits of the evening will not permit me to touch upon. A comparison of the four profiles between Whale sound and Independence bay is very interesting, and brings out the relief of the "Great Ice" in a very clear manner, showing it is really a very much flattened mountain system in ice, with its main backbone, its radiant spurs, and its intermediate valleys. The first journey was near enough to the ice to cross the great basins of exudation, if I may use the term, and their intermediate devise, and the profile shows a succession of ups and downs, like those of a railroad located along the foothills of a mountain system. The profile of the return journey of the same year shows but one depression, and that in the Humboldt basin. The profiles of the two journeys of 1895 are ideal in that they show a rapid ascent from Bowdoin bay to the surface of the central ice-mass, and then a gradual radiant along the western slope of the continental divide till the summit is reached about 180 miles from Independence bay, when the descent is rapid to the edge of the ice. That the crest of the Greenland continental ice divide is east of the country's median line there can be no doubt. Where it is crossed on the way to Independence bay, it is trending away to the north-west and rapidly decreasing in altitude, to lose itself in the landward slopes of the

"Great Ice" near the convergence of Victoria inlet and the north-west coast. From this continental divide extend spurs into the Cape York peninsula, Prudhoe Land, Washington Land, Hall Land, etc., and between these divides are the enormous basins which feed the glaciers of Melville bay, Inglefield gulf, Kane basin, Petermann and Sherard Osborn fjords.

There is one thing of special interest to the glacialist—the transportation of snow on the ice-cap by the wind. No one who has not been there can have any conception of its magnitude. The wind is always blowing,

MOVING THE BIG METEORITE.

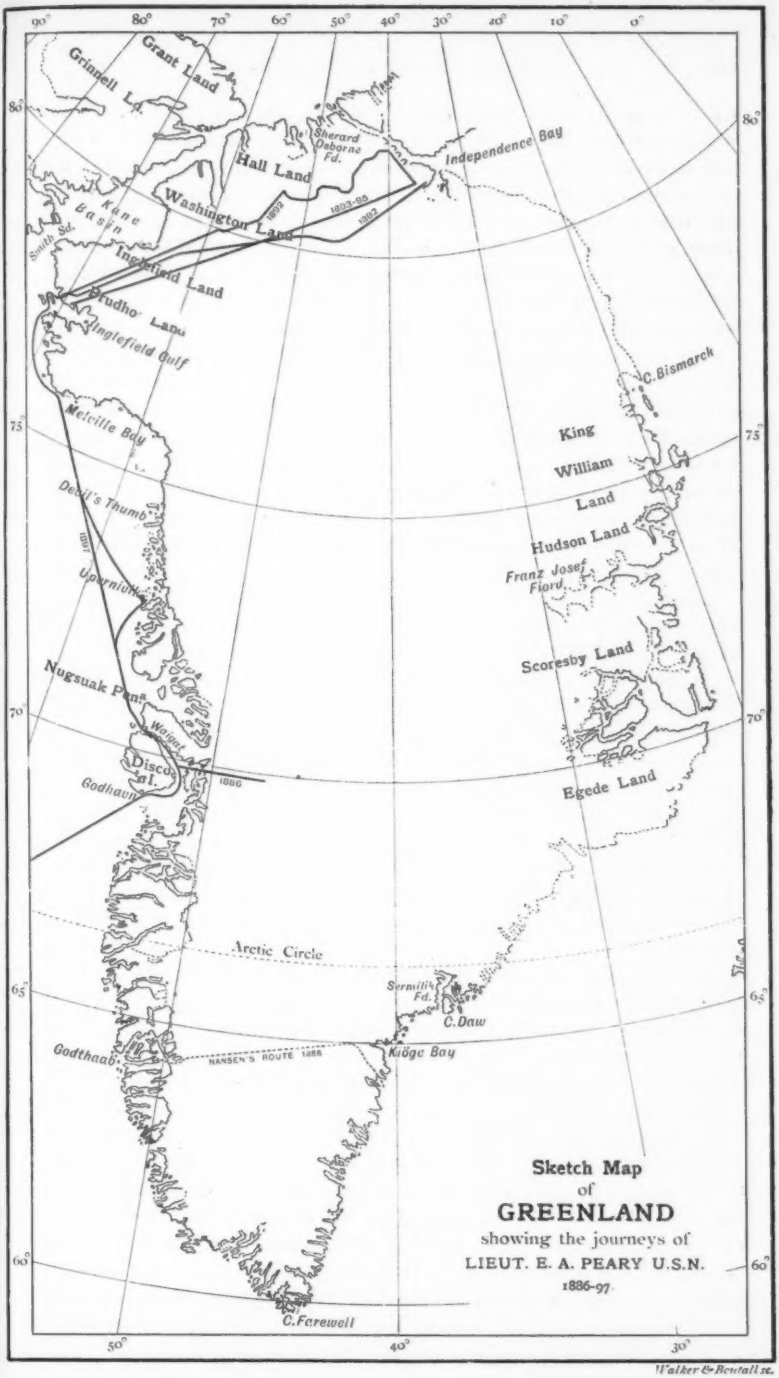
and blowing almost always on lines which would be gravity lines from the interior. The regularity of the winds of the "Great Ice" of Greenland, as I have found them during an actual sojourn of over seven months upon the ice-cap and visits to it of greater or less duration in every month of the year, is phenomenal. Except during atmospheric disturbances of exceptional magnitude, which cause storms to sweep across the country against all ordinary rules, the direction of the wind of the "Great Ice" of Greenland is invariably radial from the centre outward, normal to the nearest part of the coast-land ribbon. So steady is this wind, and so closely does it adhere to this normal course, that I can liken it only to the flow of a sheet of water descending the slopes from the central interior to the coast. The direction of the nearest land is always

easily determinable in this way. The neighbourhood of great fjords is always indicated by a change in the wind's direction; and the crossing of a divide, by an area of calm or variable winds, followed by winds in the opposite direction, independent of any indications of the barometer.

The opinion has been forced upon me that the wind, with its transporting effect upon the loose snow of the ice-cap, must be counted as one of the most potent factors in preventing the increase in height of the ice-cap—a factor equal perhaps to the combined effects of evaporation, littoral and subglacial melting, and glacial discharge. I have walked for days in an incessant sibilant drift of flying snow, rising to the height of the knees, sometimes to the height of the head. If the wind becomes a gale, the air will be thick with the blinding drift to a height of 100 feet or more. I have seen in the autumn storms in this region, round an amphitheatre of some 15 miles, snow pouring down in a way that reminds one of Niagara. When it is remembered that this flow of the atmosphere from the cold heights of the interior ice-cap to the lower land of the coast is going on throughout the year with greater or less intensity, and that a fine sheet of snow is being thus carried beyond the ice-cap to the ice-free land at every foot of the periphery of the ice-cap, it will perhaps be seen that the above assumption is not excessive. I feel confident that an investigation of the actual amount of this transfer of snow by the wind is well worth the attention of all glacialists.

One of the results of the 1893–95 expedition was the location of the mysterious "Iron mountain" of Melville bay. When in 1818 Sir John Ross discovered the existence of the Cape York Eskimo, he found in their possession native iron. That iron, when brought home, was found to contain nickel, and it was supposed to be of meteoric origin, until later the so-called Nordenskjöld irons were found to be telluric, not meteoric, and it was then assumed that this northern iron must also be telluric. Various efforts were made to discover this "Iron mountain," but I was fortunate in being the first white man to locate it, which I did in 1894. Starting from my headquarters on the north side of Inglefield gulf with an Eskimo guide, and following into Melville bay for some 34 miles, I found the Iron mountain to be, not a mountain, but three great ingots of meteoric iron, one weighing about 1000 lbs., another 6000 lbs., the weight of the other indeterminable.

The Eskimo legend in regard to these masses is that they were originally an Innuit or Eskimo woman, who for some impropriety had been thrown out of high heaven, and, with her dog and tent, had landed in that inhospitable region. The 6000-lb. mass was the woman. This was the one from which the Eskimos have obtained their iron supplies for generations. Heaven seems to have taken pity on these isolated people, and sent them these masses of pure soft iron to enable the entire


Grant Land
Grinnell Ld.
Hall Land
Sherard Osborne Fd.
Independence Bay
Washington Land
1893
1893-95
1892
Kane Basin
Smith Sd.
Inglefield Land
Prudhoe Land
Inglefield Gulf
C. Bismarck
King William Land
Melville Bay
Devil's Thumb
1891
Upernivik
Hudson Land
Franz Josef Fiord
Scoresby Land
Nugsuak Pen.
Waigat
Disco I.
1886
Godhaun
Egede Land
Arctic Circle
Sermilik Fd.
C. Daw
Godthaab
NANSEN'S ROUTE 1888
Kröge Bay
C. Farewell
90°
80°
70°
60°
50°
40°
30°
20°
10°
0°
80°
75°
70°
65°
60°
Sketch Map
of
GREENLAND
showing the journeys of
LIEUT. E. A. PEARY U.S.N.
1886-97.
Walker & Boutall sc.

tribe to pass from the stone age to the iron age. Without that there was no possible means by which they could obtain metal, any more than you or I could obtain something from the planet Mars; and one of the most striking points in proving the intelligence of these people is the fact that they noted that these great masses were different from any other substance round them, discovered their valuable characteristics, and devised means of utilizing those characteristics. Two of these masses I brought back in 1895. In 1896 I went back with my steamer with the idea of removing the third, my appliances in 1895 having been insufficient; but, though successful in ripping it out of its frozen bed, and moving it something like a quarter of a mile to the edge of the shore, before I could get it embarked, the Melville bay ice began driving in, and I was forced to take my ship out as quickly as I could to prevent her being crushed. In 1897 I made another attempt, and succeeded in embarking the huge mass and transporting it to New York, where it now lies. The dimensions of the largest mass are approximately 12 feet × 8 feet × 6 feet, and the estimated weight something like 90 tons.

Returning in 1895, feeling that the capabilities of the Greenland ice were practically exhausted, I formulated a plan for further work, in case the problems of the north had not been solved by the time I returned.

Immediately after my return it would have been premature to have presented any project for further arctic exploration with two magnificent expeditions still in the field, those of Jackson and Nansen.

With the return of Jackson and Nansen, bringing the news that Franz Josef Land was not the southern terminus of an arctic continent, but an archipelago of comparatively limited extent; and that the *Fram*, in her three years' drift through the Siberian segment of the polar basin, had seen no land, I felt that the time was ripe for the presentation of my plan for further work. I believed that the practical demonstration of the non-existence of land of any considerable extent in the Siberian segment of the polar basin practically eliminated that region from further consideration as a possible means of reaching the pole. The land lying north of main Greenland remained the most northerly known land on the face of the globe, and it could now be said that the route along the north-west coast of this land, with *terra firma* for a base, was not merely the *most* practicable route, but that it was the *only* practicable route by which to reach the yet unscaled apex of the Earth, the north pole. Acting upon this belief, my theory was to proceed with my ship to Whale sound, take on board eight or ten of the most effective young men of my Eskimo (I know every man, woman, and child in the tribe and their peculiarities), the most loyal and energetic, with their wives, their dogs, their tents and sledges, their canoes, weapons, and implements—all their belongings, in fact—transport them to the farthest possible point to which I could take my ship, making Sherard Osborn

fjord my objective point. There I would land with my people and supplies and establish a colony, a settlement which would be normal, just like any other Eskimo settlement, except that it would be 200 or 300 miles further north. The environments and conditions of life would be practically the same, and my Eskimo would feel at home. Establishing my settlement there, I shall send my ship back.

As soon as she has left, and the ice has frozen sufficiently for my purpose, I shall, with the assistance of the Eskimo, begin transporting my supplies by comfortable stages north-east along the coast, shifting my village ahead from time to time, until with the return of the sun in the spring I should hope to be, with my people and a large depôt of supplies, at the most northerly point of the land, wherever that may be. We know the land here extends beyond 83° 24′; it is very likely it reaches to 85° N. In February, or perhaps in March, I shall start with two or three still further selected people, the best of those I have taken, with me, my best teams of dogs, with specially constructed sledges, everything in the way of supplies and equipment refined to the minimum limit, and shall endeavour to make the distance from there to the pole and back again. By some it is called a dash; I do not believe in the term myself, and yet, if it is unbroken ice, it must be accomplished, if it is accomplished at all, in a continuous journey. It may take three or four months, and the magnificent experience of Nansen, as well as my own, shows that there are no insuperable difficulties in keeping a party in the field for that length of time. In other words, the programme is to secure every mile of advance just as far as there is land, and then attempt to accomplish the remaining distance in one effort. In case the conditions are unfavourable or impracticable the first season, I shall return to my Eskimo village, winter there, and start again the next spring; and if the conditions are not favourable the second year, come back for the winter and start again, and again. I believe that at any point in the arctic regions, at one time or another, at one season or another, the door is open or can be opened, and the man who is in readiness and waiting for the favourable opportunity can get where he wants to. When an expedition goes north for one or two years only it may not find the favourable opportunity; but if it can stay the four or five years which I am prepared to stay if necessary, some time in that period the favourable occasion is sure to come, and the door will be open or can be pushed open. On my return from the northern trip, or in the interim between successive attempts, I should endeavour to complete the geographical features and characteristics of the northern land and the north-west coast of Greenland, and endeavour also to fill in the outline of the east coast down to Cape Bismarck; in other words, to complete the delineation of the land-masses of this section of the arctic basin. Then I shall retrace my steps along the north-west coast to my original base at Sherard Osborne fjord. From here I shall return in

my ship, if she succeeds in effecting the connection; otherwise I shall ascend to the ice-cap from the head of Sherard Osborne or Petermann fjord, and take the route with which I am so familiar, across the inland ice to Whale sound, where my ship can reach me without difficulty.

Such, in brief, is my project for the proposed work, and I must say, though perhaps I am egotistical, that it does seem to me as if the conditions were favourable. Experience counts for a great deal in arctic work. Success in arctic navigation is the result of that definite, detailed knowledge of coasts, winds, tides, and ice, the same kind of knowledge for each step of the voyage that a harbour pilot has. You must know what the effect of a given wind is upon the ice at any point along the coast, the effect of the ebb and flood tide, as, knowing these things, you can put your ship through with safety, or keep her out until a favourable time comes. I feel that I have, in the last five or six years of my life, obtained a knowledge of some of these details of arctic work, and outside of all that is the fact of my utilization of the Eskimo. You will agree with me that there can be no human beings on the face of the globe better adapted to form the rank and file of an arctic party than members of their little tribe, the most northerly people in the world, whose fathers and grandfathers and great-grandfathers before them have lived in that very region. They know all the possibilities and all the hostilities of their frozen home, and know how to take care of themselves. Further, they have confidence in me and regard me as a friend, and would travel with me, and starve with me should it be necessary. I feel that, with an experienced surgeon and perhaps one other white man, and that material from which to recruit the rank and file of my party, it would come near being an ideal party for arctic work.

The question has frequently been asked me, What do I expect to find north of Greenland? I don't expect. My object is to try and find out. The matter of possible opposing current comes up. I can touch only briefly on that. We know the strong southerly setting current along the east coast of Greenland. That current must have been diverted by something, and it must be land more or less dense to the north of main Greenland. Then the query arises, Why should I not find just the same ice as other explorers have found? Undoubtedly I shall; yet, from what I have seen of arctic ice, I am convinced that particularly rough ice is apt to occur in areas. These areas may be of considerable extent, 50 or 100 miles across, but, with an opportunity for reconnaissance, a way can be found around them on comparatively smooth ice, and the area of rough ice avoided by a *détour*.

Such is the brief outline of my past work and future plans. In regard to the latter, it gives me pleasure to say that already the preliminaries are effected. While north last summer I selected the

Eskimo for my colony, gave them their instructions, and they are preparing for my return, the funds and time for my work are assured, and I shall start late next July.

I thank you for your cordial interest and attention.

Before the reading of the paper, the PRESIDENT said: At last we have Lieut. Peary amongst us. He has been promising to come over here for the last five years, I think, but he has always been prevented by the exigencies of work in the arctic regions. He has given us very good excuses indeed for not coming. However, now that we have him here, I feel quite sure that this meeting will give him a hearty and cordial welcome. I will now call upon Lieut. Peary.

After the reading of the paper, the PRESIDENT said: I think I must first congratulate Lieut. Peary on having been listened to by the audience with greater interest than I have ever seen in this hall. You have Sir Leopold M'Clintock before you, who could tell you something about the route you are about to take; Sir Erasmus Ommanney, Sir Allen Young, Dr. Neale, Mr. Jackson, and at least half a dozen other arctic explorers. I see also very eminent naturalists, Prof. Bonney, Mr. Blanford, Mr. Sclater, and others. They would all have liked to have joined in the discussion of this subject, but I am afraid it is too late to expect a long discussion. We shall, however, be pleased to hear a few words from Sir Leopold M'Clintock.

Admiral Sir LEOPOLD M'CLINTOCK: My first duty is to thank our President for allowing me this opportunity of expressing my admiration of the good work performed by Lieut. Peary, his wonderful endurance, and his wonderful perseverance in carrying out the exploration he has brought so far to complete success. I have only to express at this late hour my hope, in which I am sure every one will join, that he may be thoroughly successful in his next arctic expedition.

The PRESIDENT: Lieut. Peary is, without exception, the greatest glacial traveller in the world. He is also far and away the greatest dog-sledge traveller in the world, as regards rapidity and distance. The important work he has done, the discoveries he has made, are patent to you all. He has found out a mystery of centuries—a mystery even alluded to by the great Lord Burleigh: he has found out the termination of the Greenland glaciers. By what means he has done this you have heard, and he has illustrated what he has done by the most beautiful pictures that we have ever seen on that sheet. Great though that work has been, I cannot help alluding to another piece of work which I look upon as almost as great —that is, the salvation of the Arctic Highlanders. When I went with Sir Erasmus Ommanney in the *Assistance* amongst these people, we found them with sledges, but without any means of catching the walrus, except their arms, to fight with them on the edge of the ice. They had no canoes, no guns, but most remarkable-looking knives, which they cut from these marvellous aerolite boulders, which Lieut. Peary has discovered. The Arctic Highlanders would probably have died out if they had been left alone. Lieut. Peary has provided them with the means of catching their food by going out to sea in canoes. He has provided them with the means, which they never had before, of catching the reindeer; and they are now, as he has told you, certainly since 1850, increasing in population. I concur with him that one of the most interesting points in his projected journey is the company of this most interesting people—the only people in the world who are completely pure in blood and completely isolated. Lieut. Peary tells us that he has made a census of them. He knows every man and woman and child, and all their names and relationships to each other, and their fathers back to their great-grandfathers and grandmothers. I think that the salvation of that people is a great feather in the cap of Lieut.

Peary, and I think he well deserves the devotion and loyalty that he has secured from them.

You will wish, I am certain, to pass by acclamation a vote of thanks to Lieut. Peary for this most interesting account of his journeys, and for the extremely beautiful illustrations he has provided to-night. You will also wish to pass an expression of your earnest wish that he may be successful in the grand undertaking before him, and which he has sketched out to you. I have to express to you, Lieut. Peary, the thanks of the meeting for your paper and illustrations.

Lieut. PEARY: I can only say I thank you sincerely for your appreciative interest. I felt from the first we were in sympathy; I know it now. I thank you for your vote of thanks.

FOUR YEARS' TRAVEL IN CENTRAL ASIA.*

By Dr. SVEN HEDIN.

IN such a short lecture as this, it is no easy task to give even the outlines of a journey of research which, during three and a half years, led us in innumerable bends and turns from the one end to the other of the greatest continent of the world, to give an account of the results gained and the observations made in different branches of science, or to describe the varying adventures to which a traveller cannot help being exposed on such a journey. I therefore beg you kindly to make allowance for the brevity to which I am compelled, and for the gaps which must necessarily occur on account of my dwelling on points of general interest. Thus I pass over the journey through the Kirghiz steppes and across Tashkend to Margilan.

After having crossed the Pamirs in the winter and spring of 1894, I undertook, in the summer and autumn of the same year, my first excursion to Eastern and Central Pamir, taking Kashgar as starting-point; in the spring and summer of 1895, a journey through the Takla-Makan desert and the north of Eastern Turkistan; and in the summer and autumn of the same year, finally a third excursion to the Eastern and Southern Pamirs. In the same way, I afterwards made Khotan my basis of operation, starting from this place in the beginning of 1896 on my long journey around Eastern Turkistan and to Lob-nor, and when I left Khotan at the end of June, 1896, I had "burnt my ships" in earnest, cut off all possible connections with the occident, and given up all hopes of renewing this connection before I had reached Peking in the far East.

It was a hard campaign which was begun on February 23, 1894, when, with a caravan of twelve horses and four men, I left Margilan to cross the snow-covered Pamirs by the tortuous mountain-path leading

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* Read at the Royal Geographical Society, November 22, 1897. Map, p. 332.

across steep rocks, across rivers and gravel-pyramids, up through the Isfairam transverse valley to the crest of the Alai range. The first stages were easy, but higher up we cross the river time after time on trembling wooden bridges. The valley is narrow and picturesque; the silence is only disturbed by the shrill commands of the men, which give a ringing echo against the perpendicular rocky walls, and by the roar of the river below us. The caravan proceeds slowly up the dangerous path, which, scarcely a foot wide, runs along the very verge of the precipice. Still higher up, the path was covered with a smooth sheet of ice, and sloped towards the brink of the yawning gulf. The first horse was led by a Kirghiz, who was well acquainted with the way; but it slipped, slid down the sloping path, passed over the verge, turned several somersaults in mid-air, and was crushed on the slate in the bottom of the valley. Such smooth ice-coverings became quite usual higher up, and we were obliged to cut steps in the ice with spades and picks, and then strew sand on the steps. This took time. It got dark, and only the stars lit up the wild landscape with their pale light. The horses were led in single file. We slid, crept, and dragged ourselves along the edge of the precipices. After enormous exertions, we reached, a few days later, the crest of the Alai chain, in the Tengis-bai pass, 12,600 feet high, where the snow lay deep. The view from this point is delightful; we are surrounded by snow-covered ridges in all directions, but in the south-east we see in the distance the Trans-Alai range, with peaks which disappear in the clouds, and snow-fields of dazzling whiteness.

The Tengis-bai is one of the boundary-marks between the river districts of Sir-daria and Amu-daria. The southern slope is also steep, and we rode across one fresh avalanche after another. One of the largest, which was over 400 yards wide, had fallen the day before, and the Kirghiz congratulated us on having escaped its fury. The day after we had passed Tengis-bai, there was a violent snow-buran, and if we had been belated one day, we should doubtless have all been lost in the pass. Tengis-bai has given many a Kirghiz a nameless grave.

During the whole march through the Alai valley we had deep snow, and were obliged to have four camels led in front of us to tramp down a path through the snowdrifts for the horses. Once we were stopped by a gulley about 150 yards wide, in which the snow had drifted to a depth of 10 feet. We could not cross except by having the Kirghiz spread felt mats on the snow and letting the horses walk on the mats, which were moved forwards, the one after the other, until we at last reached the other side after many difficulties. The cold was severe, and the temperature sank on March 6, at Urtak, to 30° below zero Fahrenheit, while we were not able to get up the temperature in the tent higher than 24·8° below zero, although the tent was full of Kirghiz.

In the Alai valley, about 250 yards from Kipchak, Kirghiz pass the winter. Near the end of May, when a rich growth of grass succeeds the snow, there is life in the valley. All the rich Kirghiz of Ferghana then come here with their herds, and make their "yeilaus," or summer camps, on the banks of the Kisil-su. They then perform their "baygas," or games on horseback, invite each other to feasts, celebrate marriages, and enjoy their summer in every possible way.

The climate has also its peculiarities—the sun burns one in the face on one side, while on the other one is near freezing. At midday on March 5 the thermometer showed in the shade 14° Fahr., but the insulated thermometer showed 125°. A range of 100° in six hours are very usual during the winter. The lowest temperature which I observed was on the night of March 10 at Koksai, namely, −36·5° Fahr. After the skin has changed a few times, the face becomes copper-coloured, and as tough and dry as parchment. Moist food dries up to stone, preserves freeze to chunks of ice. The greatest danger in crossing the Pamirs during winter is the snow-burans. If the caravan is overtaken by one of these burans, it is necessary to keep close together, for if any are separated from the main body, it is impossible for them to make themselves heard above the howling of the storm either by shouting or firing off rifles, and they are lost and freeze to death. Thus we always camp when the storm comes on.

Crossing the Kisil-art pass in the Trans-Alai mountains, we reached the Great Kara Kul on March 10. For two days we marched across its ice-covered surface, and I sounded its depth in seven places, and found it to be at the most 756 feet deep in the western basin. In the Mus-kol valley we found two very peculiar ice-volcanoes, which were formed by spring water oozing out of the ground and freezing in layers, one of these being 16 feet, and the other 26 feet high.

On March 16 we rode in a blinding snowstorm across the Ak Baital pass, and, two days later, down through the Murgab valley to the little Russian fort, Pamirski post, where the Russian flag waves over the roof of the world. Here I was very politely received by six officers and 160 Cossacks, and had a pleasant rest after all my hardships.

On April 7 we broke up again, and rode across Rang Kul to the Chugatai pass, where we cross the Chinese frontier. We had five days' marches to the frontier fort, Bulun Kul, where Yan-darin was the commander. Wild reports in regard to my approach were already circulating here. It was said that I was escorted by sixty Cossacks armed to the teeth; my tent was surrounded at night by Chinese guards; they even insisted upon opening the chests containing my luggage and provisions, in order to be sure that I was not smuggling Russian soldiers across the frontier in them; and the Kirghiz were forbidden to supply me with mutton and other necessary articles. After

many "ifs" and "ands," I was given permission to visit Mustagh-ata. I had only time, however, to do some preliminary work, when, after an attempt to ascend the mountain which was frustrated by a snowstorm, I was attacked by inflammation of the eyes, which compelled me to hurry back to Kashgar. During the summer and autumn of 1894 I continued my researches in Eastern Pamir; but I will pass by them in silence, in order to say a few words about the magnificent mountain which so captivated my interest.

As Mount Demavend plays an important part in the popular fancy of the Persians, so in the eyes of the Kirghiz does Mustagh-ata, as it is enveloped in a mysterious shimmer, and is clad in a variegated mantle of

MY TARANTASS IN THE KIRGHIZ STEPPE NEAR LAKE ARAL.

fantastic traditions and legends. They look upon Mustagh-ata as a holy mountain—a *masar*, or grave of saints—where seventy-two saints are buried, and among them Moses and Ali. They tell that only an old *ischan*, or holy man, had, in ancient times, ascended to the top of this mountain, where he found in a garden a white camel and old men in white garments and with long white beards; and they believe firmly that there is a city, which they call Yanaidar, whose inhabitants are absolutely happy and possess all the enjoyments of life; where a perpetual spring prevails, where the gardens always bear fruit, and where the women are beautiful and never grow aged. They declared that the mountain could not be ascended, abysses and acclivitous slopes preventing any progress, the cliffs being covered by ice as bright as

steel; and the wind—the sole master of the region—would sweep us away like grains of sand, we were to attempt to set the giant at defiance.

Like a mighty outpost against the Central Asian deserts, the Mustagh-ata, one of the highest mountains of the world, and surely the highest of the Pamir, rises 25,590 feet, and is at the same time a worthy continuation of the tremendous ranges—the Himalaya, Kuen-lun, Kara-Koram, Hindu-Kush, which meet here on the roof of the world. It constitutes the culminating point of the meridional chain which brings the Pamirs to an end in the east, and is called Mus-tagh, or the ice mountains, and the name Mus-tagh-ata, or the Father of the ice mountains, points at once to its superiority.

If Mustagh-ata formed a regular cupola, it would even then, according to the laws of nature, be encased in ice-armour covered with snow and *névé*, and this ice-armour should, in zones, have the same thickness if we disregard the climatic factors. In reality, however, the irregular form of the mountain enjoins quite a different distribution of the masses of ice. Generally speaking, the higher regions of the mountain are, to be sure, covered with an enormously thick mantle of ice, which stretches out its apophyses-like tentacles to the depressions of the *névé* basins and the glacier passages, but its thickness and extent are very uneven on the different slopes. The north top, which I ascended 19,653 feet (about the height of the summit of Kilimanjaro), on August 6 and 16, was at this altitude covered with a layer of *névé* and newly fallen snow 1½ foot thick, which lay immediately on weathered rock bottom. The case is quite different further to the south, as I found in attempting an ascent on August 11 with six Kirghiz and nine yaks. Here we ascended on the western rocky crest of the Chak-tumak glacier to a height of 15,584 feet, where the rock disappears under the ice. At this height we can see two of the prominences of the armour-ice, the nearest of which possesses most of the qualities of an ordinary glacier. Its front wall is 20 metres (66 feet) high, and perpendicular, and at its base lie blocks of ice which have fallen from above; but there are no moraines. The snow-covered surface is cut up by transverse and convex crevasses, a brook formed by the melting ice runs down from the front. We afterwards continued our ascent on the ice, whose snow-covering kept the yaks from slipping, although the slope is 24° steep. Gradually we came into a system of parallel transverse crevasses at least 1 foot wide and 33 feet deep, but they were usually covered with snow, so that the yaks turned one somersault after the other. Higher up they became more scarce, but the snow increased. At a height of 18,537 feet, the first yak disappeared suddenly in a crevass, but fortunately fastened by the horns and one hind leg, so that by passing ropes around him and hitching them to the other yaks, we were able to haul him up. The crevass was 4½ feet wide and 26 feet deep,

and its walls consisted of dull blue ice. A little higher up all progress was barred by a crevass 20 feet wide. The snow lay here nearly 2 feet deep; 650 feet above us rose mighty ice protuberances, with wild jagged forms, resembling walls, pyramids, and towers, frequently with vertical sides of clearest ice, otherwise covered with snow.

My limited time prevents me from describing our many glacier journeys. They were performed under very difficult conditions, for we had to work at a height which by 6560 feet exceeds that with which one is accustomed on the glaciers of the Alps. It would also have been difficult to stand all the hardships to which we were

KIRGHIZ WOMEN ON THE MURGAB.

exposed if it had not been for the tough and hardy yaks, which mounted to a height of 19,750 feet without complaining. I camped at several points at a height of about 14,000 feet, a height equal to that of the summit of the Finsteraarhorn, and from that made excursions. The glaciers which were specially surveyed were Gorumdeh, Sarimek, Kamper-kishlak, Jam-bulak, Chak-tumak, Tergen-bulak, and Chum-kar-kashka, while the two Kok-sel glaciers, Sar-agil, Shwer-agil, Aftab-urui, and Gerdumbeh were only mapped from a distance. Jam-bulak is the largest, and has a breadth of half a mile and a length of 5½ miles. I will not leave them, however, without mentioning some of the laws which govern them all. The glaciers of Mustagh-ata are all retreating. Old moraines, glacier clay, and erratic blocks extend in the north all the way to Basik-kul, and in the south to Kara-su. The position of the

glacier-fronts vary somewhat, however, with the seasons of the year, advancing a few yards in the summer, when the glacier movement is strongest, but retreating again in the winter, when the glacier movement almost ceases, and the fronts are constantly worn by ablation. In a couple of places I planted a chain of measuring-poles straight across the glacier, in order to ascertain the rate of its movement. I discovered the greatest speed at a point in the middle of the Jam-bulak glacier, which, from August 3 to 18, advanced $14\frac{3}{4}$ feet, or hardly 1 foot per day.

From north to south the glaciers become gradually smaller, but the old moraines become slowly larger, which depends upon the fact that the glaciers which have been most exposed to the sun have developed a higher speed. In the glaciers which run west, the left half is always higher and larger than the right half, since the shade afforded by the rocky walls on the south in some degree prevents the glacier from melting on this side; but after the glacier emerges from the rocky passage, its left side melts faster, on account of its being exposed to the sun on the south. The left and lateral moraines are always larger than those on the right. The central and front moraines are generally rudimentary. Nearly all the glaciers form at a certain height falls, which cause transverse crevasses; longitudinal and circular crevasses also occur. The angle of fall is always very sharp. On the rocky wall on the right of Chaktumak, I saw a very fine example of a falling glacier. The rocky wall is perpendicular, and rises 656 feet above the surface of the glacier, bearing on its top a spur of the ice, which gradually extends over the edge of the precipice, and occasionally breaks off in great blocks. These blocks of ice are crushed against the protruding rocks below to a fine white powder, which, like a waterfall, rushes down on to the surface of the main glacier, there to form a regenerated parasite glacier.

Mustagh-ata consists almost exclusively of gneiss and crystalline schists. The gneiss occurs in many and very beautiful varieties.

The melting brooks of the glaciers running west are accumulated by the Su-bashi river, which discharges itself into the Little Kara-kul, a pretty alpine lake which has been formed by a dam consisting of an ancient moraine. The northern brooks flow into the Ike-bel-su, a mighty rushing river in the summer, which, under the name of Gez-daria, cuts a passage through the Mustagh-ata chain in a deep cross-valley. The southern brooks join the Kara-su, one of the tributaries of Yarkand-daria. The great fall of hail and snow on Mustagh-ata, especially during the summer, when we had hail or snow nearly every day, has always one destination, namely, Lob-nor, no matter whether, during its metamorphosis, it is carried to the north or the south.

After having spent the winter in Kashgar, I again broke up camp in February, 1895, and started on my journey across Maral-bashi to

Merket on Yarkand-daria with two great *arbas*, or high-wheeled carts, which creaked and groaned under their heavy burdens. We had to cross the Takla-makan desert to Khotan-daria, a distance of about 200 miles, and I thought that I should find vegetation, springs, and perhaps traces of ancient civilization at the foot of Mazar-tagh, the mountain-range seen by Prjevalsky and Carey, which was supposed to extend straight across the desert. It was my intention afterwards to continue to Tibet, and we therefore had a very great amount of luggage —provisions, winter clothes, tents, weapons, ammunition, etc., and since we also took with us a supply of water for twenty-five days, our eight fine camels were heavily loaded when we left Merket on April 10, and

VIEW FROM THE MOHAMMEDAN TASHKENT.

started off for the unknown East. We had in our caravan, besides the camels, dogs, sheep, and hens, with a cock that woke us in time every morning. The first few days we found one or two eggs every morning in the nest basket, which was placed on the back of one of the camels; but when the water-supply began to run low, the hens left off laying eggs. At last I had four men—my faithful body-servant, Islam-bay, who accompanied me throughout the whole journey, all the way to Urga in Mongolia; Kasim, from Yarkand; Muhammed Shah, from the same town; and the desert-man, Kasim, who had frequently travelled in the desert in search of gold, like the rest of a whole tribe of good-for-nothing people living on the edge of the desert, firmly believing that they will sooner or later find great treasures hidden in the desert sands. In

some places the desert is called Dekken-dekka, because it is believed that 1001 cities have been buried in the sands. I heard of a man who had found a city, in whose houses Chinese silver yambans were lying in great heaps. He had taken with him as many as he could carry; but just as he was about to return with his plunder, a great flock of wild cats rushed out at him, and scared him so that he dropped his precious burden and fled for dear life, but he could never find the place again. In another city corpses had been found in a posture indicating that they had been suddenly struck dead while engaged in their daily occupations. I had an opportunity of hearing many just as comical and adventurous legends, which only increased the attractions of this dangerous journey. During the first thirteen days everything went off well, and we could get water every day by digging. It was brackish, to be sure, but it was good enough for the camels to drink. At last we really reached a mountain-range, which we took for granted to be the continuation of Mazar-tagh, at the foot of which there are two beautiful small lakes, which are plainly formed by some branch of the Yarkand-daria. In the reeds there were ducks and geese, and on the shores grew poplar, tamarisk, and kamish (*Populus diversifolia*, *Tamarix elongata*, and *Lasiagrostis splendens*). We rested here two days, and for a couple of weeks after we looked back to this place as a paradise.

On the 23rd we resumed our march. After two hours the mountain disappeared in the dust-filled air, and we never afterwards saw any traces of any Mazar-tagh, therefore the two mountains are isolated. Before us stretched the dreary but agitated desert sea, with dunes from 80 to 100 feet high. We rested at the last tamarisk, which the camels stripped of both bark and leaf. A well was dug, but we got no water. I had ordered a water-supply for ten days to be taken with us from the lake, but I found, after it was too late, that only a four days' supply had been taken. The desert man, Kasim, said that after four days we should reach a place where water could be had, and since his statement agreed with the maps which I had, I relied upon him.

The next day a violent west wind blew the sand in great clouds from the tops of the dunes, so that the whole horizon was quite dark. We had left the last stretches of clay ground behind us, and now everything was sand. The dunes lay north and south to a height of 150 feet. Islam-bay went at the head of the caravan with the compass in his hand, and had orders to keep due east, where Khotan-daria should be nearest to us. We went in crooks and roundabout ways, in order to avoid the worst sand. The desert resembles a petrified sea with giant waves. Every morning the same desolate landscape spread out before us. Every trace of life was lacking. Not even a fly was to be heard in the air, not even a yellow leaf broke the monotony.

On April 26 we left two dying camels, with their empty water-tanks, to their fate. If we were saving, our water-supply would last

two days more, and we expected at any moment to find well-water; but this was a vain hope, and if we had had the least idea of what was to come, we should have returned to the little lakes. That evening we came to a small piece of clay ground between two dunes, and the men stripped off their clothes and took turns at digging a well with the courage of desperation. At the depth of one yard, the ground became damp, and our spirits rose. All the animals, even the hens, waited impatiently around the well, which was becoming deeper and deeper; but at the depth of 10 feet the sand again became dry, and the well was deserted in disappointment. The camels now had to eat up their

CROSSING THE ARIS RIVER.

saddles, which were stuffed with hay and straw, and then the whole supply of bread.

On the 27th we saw two geese flying towards north-west, and they fired our hope. I now went on foot all the time, in order to keep as straight a course to the east as possible. The sand did not decrease. Wherever the eye turned there were whole chains of dunes, in which one sinks and feels one's self held fast. We were as saving as possible with the water, and the animals did not get a single drop more, but in the evening thick clouds rose from the western horizon, and the tent was spread out on the ground. All the men stood in readiness to take hold of its corners if the rain should come, but this was also a vain hope, for the clouds blew over to the south-east without a drop of rain touching us. We did not pitch the tent any more, although the night air was cold, frequently being only a couple of degrees above freezing-point, while on

clear days the glass showed about 85° to 100° Fahr. When, on the 28th, we were awaked by a sandstorm, the whole camp was buried, and many objects had to be fished out with staffs.

During the march we were enveloped in a sandcloud so thick that it was as dark as night, and a dark, fire-yellow light filled the air. We were obliged to keep close together, for our tracks were instantly covered by the drifting sand, and if one of us had lost the others, he would have been lost beyond recovery. Only the nearest camel could be seen through the clouds of sand; no cry could be heard, nothing but a loud whistling and hissing sound reached the ears, as billions of grains of sand shot past. Perhaps it was that these sounds led Marco Polo to fancy he heard drums and squadrons of cavalry, of which he speaks in describing the horrors of the Lob desert. One of the camels stopped on a dune, and was immediately lost out of sight for ever. In the evening we left all the provisions, clothes, chests, etc., which we could possibly get along without. On the 29th we still had two quarts of water, but it was stolen the following morning. The camels were fed for the last time with the whole of our butter-supply. The end then began to draw near. On May 1 we were tormented still more with thirst; the men drank the camels' rancid oil, and I drank some Chinese brandy, which otherwise was used for a lamp-stove. This paralyzed my muscles, and I dragged myself laboriously along, far behind the caravan, ready to drop at any moment, in the burning rays of the sun. The bells of the camels could no longer be heard, but I followed the tracks, and after walking on about 3 miles, I found the others lying flat in the sand. A couple of them were weeping and calling upon Allah. Even the camels had lain down, tired to death and with outstretched heads. We had hardly enough strength to pitch the tent. We undressed, crept into the shade of the tent, and lay there all day. Not a sound was to be heard except the breathing of the camels, which broke heavily upon the silence. We slaughtered the last sheep, in order to drink its blood, but it was so thick and sickening that no one would taste it. The men put up with a drink of a still worse character, which was provided by the camels. It was mixed with vinegar and sugar, and doubtless hurried on the death of the desert man and Muhammed Shah. They got lost the same evening, and we never heard of them again. Even Islam wasted his strength in this way.

As the sun began to set, I felt myself entirely restored, and with Islam, Kasim, and the five camels, I left the miserable camp, where everything except my notes, instruments, money, and some other necessary things were left in the tent. In order to save my strength, I rode on a camel, but it soon became pitch-dark, and we could not see where we were going, but were constantly stopped by the dunes. I therefore lit a lantern, and went on foot to find out the best passage.

At midnight we had only gone 2½ miles; one of the camels had been deserted and Islam was done for. Now that I saw the end was near, I decided to leave everything, took Kasim with me, and hurried to the east, after having encouraged Islam and told him to follow our tracks as soon as he was able to walk again. Thus we left the last fragments of our caravan in an Egyptian darkness. The lantern was left burning beside Islam, but its weak rays were soon hidden by the dunes.

I only carried the two chronometers, a watch, a compass, paper and pencil, a tin of lobster, and some cacao. Kasim carried a spade for well-digging, a couple of pieces of bread, the fat tail of the slaughtered sheep,

READY TO ASCEND THE MUSTAGH-ATA FROM YAM-BULAK, 14,500 FEET.

and a piece of coagulated blood. We did not derive much pleasure from these poor provisions, however, for the throat and all its mucous membranes soon get as hard and dry as the skin on the outside of the body, and it is impossible to swallow. The feeling of hunger disappears entirely on account of extreme thirst, which, especially during the first days, is so torturing that one is ready to go mad; but after the body has left off transpiring, a progressive debilitation sets in, which gradually leads to a crisis.

Meanwhile I hurried eastward with Kasim. We walked, with innumerable interruptions, all night. At 11 o'clock on May 2 it was so hot that it became black before our eyes, and we rested all the rest of the day. We undressed stark naked and buried ourselves in the

sand, with our clothes hung above our heads on the spade by way of protection from the unmerciful sun.

From six till one o'clock at night, we walked in the moonlight. After a short rest, we crept on over this ocean of fine yellow sand, which appeared to be endless. Suddenly Kasim stopped short on the morning of May 3, caught hold of my shoulder, and, with a blank stare, pointed to the east. I looked and looked, but could not discover anything unusual; but, with his falcon eyes, he had descried a green tamarisk, on which our hope of rescue was now concentrated, for its roots must reach down to water. When we at last reached the bush, we thanked God for his mercy, and I have never before so forcibly realized that the Mohammedans have the same God as the Christians. We rested a while, and chewed the juicy needles of the tamarisk like animals. It was the olive-branch which showed there was a shore to the desert ocean, an outlying rock which causes the shipwrecked seaman to hope that the coast is near. In the shade of another tamarisk, we rested all day, from ten till seven o'clock. In the evening we reached three fresh poplars, where we tried to dig a well, but were not strong enough; so we kindled a fire instead, in order to let Islam know where we were, if he should still be alive.

On May 4 we were discouraged again by the appearance of a high belt of sterile sand. During the hottest hours we rested again under the shadow of a tamarisk. When I dressed myself again at seven o'clock and encouraged Kasim to come on, he hissed out that he was not strong enough. I then continued alone until one o'clock at night, when I sank down in utter fatigue under a tamarisk. Some hours later Kasim came staggering up, and we continued together. After a short rest, we dragged ourselves along on May 5 with the waning strength of dying men; Kasim looked dreadfully giddy and confused. But at last our hope grew lighter—we saw a dark line along the horizon; it was the wooded banks of Khotan-daria! We walked into its leafy arbours, and realized that the river was near at hand, but were not able to walk any farther in the heat of the day, so we sank down under a shady poplar. At seven o'clock in the evening, taking the spade-handle as a staff, I crossed the wood, creeping long distances on all fours. Kasim remained where he was, lying on his back, motionless, with eyes wide open and mouth gaping, and he did not answer when I asked him to go with me.

Then the wood suddenly ended, and a plain, lit up by the pale rays of the moon, spread out before me. I at once understood that it was the bed of the Khotan-daria, but I found it dry, and waiting for the summer freshets from the mountain; but I did not think that I was doomed to succumb in the very bed of the river. I therefore crossed it, and with great difficulty reached the opposite bank, whose woods and reed thickets could be dimly seen in the darkness. It had taken me

five hours to go scarcely 2 miles. All of a sudden a duck flew into the air, water splashed, and I stood on the edge of a little pool of fresh, clear water, which was still left in the deepest part of the bed of the river, where the stream had last flowed.

I will not take up your time by describing my feelings, or what then happened. Let it suffice to say that, after I had drank, I filled my boots to the very tops, passed the spade-handle through the straps, and returned to Kasim, who was thus rescued in the very last moment; but he was not strong enough to walk, and so I walked alone three days and two nights southward in the bed of the river, living on grass and tadpoles, until on May 8 I found shepherds, and was beyond all danger.

ON THE SLOPE OF MUSTAGH-ATA, 18,000 FEET.

Encouraged by our fires, Islam Bay dragged himself along to the river, leading the last camel, that carried my notes, some instruments, and our Chinese silver.

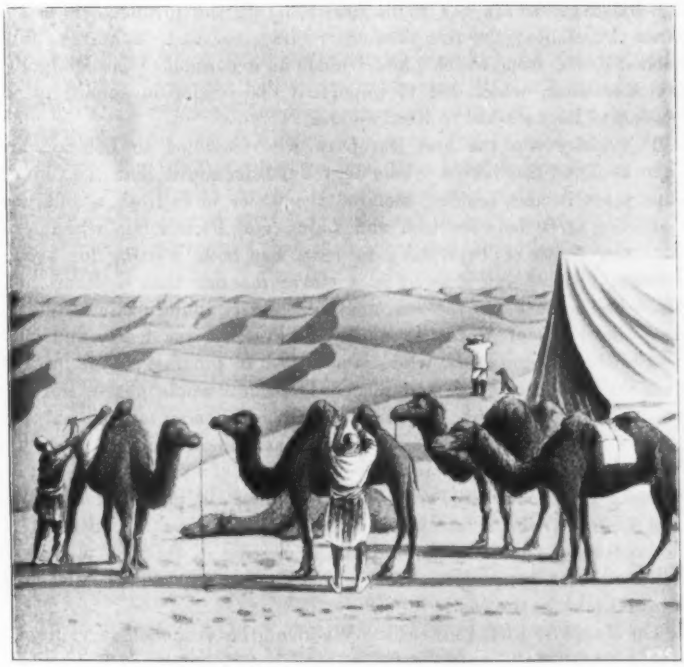
In order to repair the losses which I had suffered, I returned across Aksu and Ush-Turfan to Kashgar, and while I was waiting for the new outfit, I undertook, during the summer and autumn of 1895, a new journey to the Pamir plateau and Hindu Kush, and had a pleasant stay with the officers on the Anglo-Russian boundary commission. I never shall forget the hospitable manner in which General Gerard, Colonel Holdich, and others received me.

On December 14, 1895, I left Kashgar for the last time. In twenty-three days we marched across Ordum Padskah, Yarkand, Kargalik, and Guma to Khotan—the same way taken by Marco Polo six hundred

years ago. Between the last-mentioned towns, we passed a couple of spurs of the desert where the road is swept away by every storm. Poles have therefore been placed along the road to mark the way. It is the same custom referred to by Marco Polo, when he says that travellers erected a pole every night, in order that they might know the next morning which way they were to go.

On January 14 I again broke up camp, and left Khotan with the smallest caravan I have ever had—four men and three camels. We were to cross the great desert in its broadest place. We had gone through sad experiences, and knew full well the many dangers to be run, and we therefore made our outfit as light as possible, for fear that we should again be compelled to leave everything in the desert sands. The larger portion of our baggage was left in Khotan, to which place we must consequently return. We took provisions with us for only fifty days, but were four and a half months on the way. The worst of it was that I did not take my Chinese passport with me, and therefore got into trouble with a couple of mandarins. Such things as tent and bed were reckoned among luxuries. During this whole journey, I slept, like the men, on the ground, wrapped in furs. The temperature fell to $-7\frac{1}{2}^{\circ}$ Fahr., but we almost always had fuel, and the spring was approaching. From Tavek-kel we directed our course for some days eastward, taking with us a couple of gold-hunters, who, for a high remuneration, promised to show me the way to an old city. On January 24, when the dunes rose to a height of 45 feet, we reached the place. In the valleys between the dunes, we could see, as far as the eye could reach, ruins of houses built of poplar. As a rule, the timbers of which the framework had been built were only standing about 2 feet high. They were very much worn by drift-sand, chalk-white, hard, but so brittle that they broke like glass when struck. The walls consisted of interwoven reeds covered with plaster, on which we found some artistic mural paintings—praying women of the Arian type, Buddha sitting on the cup of the lotus, tasteful ornaments, etc. An excavation led to the discovery of a manuscript and some plaster casts. There is no doubt that this city is of Buddhist origin, and we may thus *à priori* with perfect certainty assert that it is older than the Arabic invasion led by Kuteybe-ibn-Muslim in the beginning of the eighth century. Comparative researches in regard to Buddhist art in India, in connection with the calculations I have made as to the travelling speed of the dunes, will doubtless lead to a more definite determination of the age of the city. On January 26 we reached the Keriadaria forest-belt, and camped beside the thickly-frozen river. On our continued march to the north, we made several important discoveries. It had been believed that the river soon ended in the desert, but I found that it extended as far as $39\frac{1}{2}^{\circ}$ N. lat. At Tonkusbaste it divides into two beds, which periodically alternate with each

other. In its forests there lives an almost entirely isolated tribe of nomads, of whose existence not even the Chinese have the least idea. West of Tonkus-baste, in the sands, there are the ruins of another ancient city, showing the same peculiarities as the one above described. The timber foundation of one of the houses was very well preserved. Now, since the two cities lie on a line parallel with the present course of Keria-daria, I suppose that the river has moved to the east since the flourishing time of these cities, the same as is the case with Yarkand-



IN THE TAKLA MAKAN DESERT.

daria and Khotan-daria, for whose moving eastward I have found several proofs. In the region where Keria-daria dwindles down to a little brook winding between the dunes, and finally disappears in the drift-sands, the wild camel lives in great herds in undisturbed peace and quiet. We shot three. The meat was by no means bad, and the fat in the humps was a splendid shortening for our rice-puddings. They live in the desert on sporadical tamarisks, and very seldom come to the river to drink. The herdsmen at lower Keria-daria asserted that the camels do not drink at all in the winter, and that nothing will frighten

them so much as the smoke from the camp fires. If they smelt burnt wood they would run off like the wind, and not stop for two or three days. This may be a characteristic due to atavism. I might prove this by details, but I have not time this evening.

For eight days more we had sterile desert before we saw any signs of the river Tarim, and when we marched into Shah-yar, we had crossed the Takla-makan desert in forty-one days—a journey which I would not have undone, but which I hope to be able to do again, for this desert-ocean conceals the traces of an ancient and high civilization, and the saga-like legends are not to be despised. In the primæval forests of Tarim, I classified the complicated river-system, and on March 10 we reached Korla, from which place I made an excursion to the Mongolian city Kara-shar, which led to important discoveries in regard to the relation of Bagrash-kul to Kontje-daria.

Prjevalsky was the first European who travelled to Lob-nor, and when he found this lake a whole degree further south than the Chinese maps place it, and, besides, declared the water to be fresh, a difference of opinion arose between him and Baron von Richthofen, which, ever since the death of Prjevalsky in 1888, has been waiting for a final decision. Richthofen showed in a clever manner that a desert lake which has no outlet to the sea must necessarily contain salt water, but since the basin of water found by Prjevalsky was fresh, and since the Chinese topographers, who are not used to putting things on their maps which do not exist, had placed Lob-nor a whole degree north of the lake discovered by Prjevalsky, Richthofen maintained that this body of water must be of modern formation not existing when the Chinese topographers mapped the old Lob-nor. Prjevalsky went by the main route between Tarim and Koncheh-daria, and later travellers have followed in his footsteps. If I were to be able to contribute to the solving of the problem, I must necessarily go through the desert east of the last-named river, from which an arm should branch off to an eventual lake in the east.

On March 31 I left Chikenlik. We found that Koncheh-daria divides, so that a part of its water goes to Chivilik-kol; but the larger portion, under the name of Ilek, runs south-east, and my satisfaction was great when, on April 4, after following the left bank of the river for three days, I found that, just as the Chinese and Richthofen claimed, it empties in a long lake, whose eastern shore-line we followed for three days. The people living in the neighbourhood of Lob-nor call its four basins Avullu-kul, Kara-kul, Tayek-kul, and Arka-kul, but the Chinese call the whole region Lob-nor, a name which, in the tract around the south lake, is absolutely unknown. I found the lake to run north to south, while the Chinese Lob-nor is mapped as running east to west. But even this circumstance has a natural explanation. Since the whole Lob-nor district lies nearly in the same horizontal plane, the hydrographical

distribution must be extremely sensitive to any change in level. There are two constant factors effecting such changes, namely, the easterly sandstorms, which are especially violent in the spring, filling the basin and pressing the lake westward, and the sediment carried down by the river. That the lake formerly really extended eastward is shown by the fact that the eastern shore is skirted by a series of already isolated salty pools and marshes, as well as deep bays which will soon be isolated, and by a narrow belt of forest in which three separate growths may be distinguished—in the east, dried-up dead forest; in the centre, fresh forest with tall trees; and nearest to the present shore, young forest. Thus we see that the forest travels with the lake westward. The superfluous water continues through Sadak-kul and Nias-kul to the river Tarim. There are still other proofs that the southern lake must be of modern formation. It lacks every trace of forest, while the whole Tarim system, all the way down to the ancient Lob-nor, is very rich in poplar. The forest has not yet had time to extend to the new lake. Furthermore, the eighty-year-old Lob chief, Kunchikan-bek, told me that his grandfather, Numet-bek, had lived in his youth on the shores of a lake in the north, and that then there was only deserts to be found in the region of Abdal. Finally, I might mention that Marco Polo, who travelled through the city Lob, does not say a word about any lake.

Our journey along the shores of the ancient Lob-nor was rather troublesome, for the infringing sand here lies high and soft, and the temperature at noon rose, as early as April 6, to 91° Fahr. in the shade. Our greatest torment was the gnats, which on calm days formed perfect pillars of cloud. One evening, while camping on the shore, we were so violently attacked by them that we had to resort to a rather unusual weapon—setting fire to the dry last year's reeds, which formed a dense thicket covering a larger portion of Kara-kul, and the fire spread like a prairie conflagration, spreading a lurid glare over the whole lake. A sea of fire is, at all events, something unique.

From Kum-tyeke, in whose neighbourhood we visited the ruins of an old Chinese fortress, Merdek-shahr, I sent the caravan in advance to Abdal, while, with two Lob-men, I took a very enjoyable journey by boat on lower Ilek, Tarim, and southern Lob-nor. The Lob-dwellers spend half of their life in their long narrow canoes, which are dug out of poplar trunks, and rowed by broad oars held vertically. Noiseless and swift as fishes, the light canoes glide over the dark blue bosom of the lake, with its reed-hidden shores and its playfully curling eddies. On Sadak-kul we were overtaken by a violent easterly storm; the waves foamed and hissed, and we came near capsizing before we reached the protecting narrower water-ways.

On the farthest Lob-nor, the reeds grow very thick. They are frequently 2½ inches in circumference, and reach a height of 27 feet.

The greatest depth of water which I sounded was 15 feet. The reeds are intersected in all directions by "chappgans," or passages about a foot wide, which are kept open by the Lob-dwellers for fishing-nets. These passages are made by pulling up the new shoots from the bottom every spring. When we enter such a passage it becomes dark and close, and it seems as if we were disappearing in a tunnel of reeds. We lived here on wild ducks and geese and their eggs, as well as on fish, and lived an idyllic life. My stay on Lob-nor is one of my most pleasant recollections from my journey through Asia.

From Chargalik we set out with our caravan of horses on our journey of 600 miles to Khotan, partly the same way taken by Marco Polo, and which took us through Cherchen, the gold districts of Kopa and Surgak, Nia and Keria. In Khotan, which place I reached on May 28, the obliging *amban* of this city, Liu-darin, gave me back a large portion of the things which I had lost when shipwrecked in the desert. Herdsmen and hunters from Khotan-daria had found them by following the tracks of foxes who had scented our provision-chests during the winter; but I did not find much joy in getting back my fine photographic apparatus, for the natives had taken all the negatives and put them to use as window-panes.

In Khotan we prepared for a hard campaign in North Tibet, marched back to Kopa, and from there to Dalai-kurgan, near the north foot of the Kuen-lun mountain, the last place where we found human beings. They were Tagliks, and Jaggatai-Turks, and live a half-nomad, half-domiciled life, subsisting mostly on sheep-breeding, but sometimes raising barley. They live in dens in the ground, dug in the yellow, loose layers of loess, which form a transition from the mountains to the desert.

On August 6 we left Dalai-kurgan, and marched through the secondary pass Sarik-kol to the upper course of the Mitt river, where the country is called Lama-chimin. The names Dalai and Lama, as well as Kalmak-chapp and Kalmak-uturgan, and others, remind us that Mongolians have once lived here.

(*To be continued.*)

EXPLORATIONS IN THE INTERIOR OF WESTERN AUSTRALIA.*

By the Hon. DAVID W. CARNEGIE.

THE Expedition consisted, besides myself, of Joseph A. Breaden as second in command, Godfrey F. Massie, Charles W. Stansmore, and Warri (an aboriginal boy from the McDonnell ranges, South Australia); nine

* Paper read at the Royal Geographical Society, February 14, 1898. Map, p. 332.

camels (eight packs and one riding), equipment, etc.; and provisions for five months.

July 9, 1896.—A start was made from Coolgardie, heavy rain falling at the time, but unfortunately not extending any great distance towards the interior, and, passing through Goongarrie (Ninety Mile) and Menzies, we left civilization at Cudmore's (or Doyle's) well, some 50 miles south of Lake Darlot; the country between Coolgardie and Cudmore's looking well after the winter rain, grass (a short spear-grass of no great value for fodder for stock) and everlastings, pink and white, having sprung into life, giving a very pleasing appearance to an otherwise dreary belt of country. A mob of some three hundred bullocks were camped near the well, the first lot to be brought from the Gascoigne to the Coolgardie fields by a direct route. The stockman told me that they had had no difficulty, either on account of water or feed, and had travelled in an almost direct line *viâ* Lake Way and Lawlers. These were the last white-faces we saw until reaching Hall's Creek (Kimberley goldfields) in the middle of December. Taking a general north-east by east course, so as to leave Lake Wells on our north, and strike Mounts Allott and Worsnop (two very noticeable table-topped hills) on Forrest's route of 1874, we crossed an auriferous belt near the southern end of the Neckersgat range (Wells). Here we found good green herbage and bushes, and pools of rain-water in small creeks. Numerous prospectors have visited this locality, but so far, I think, no payable gold has been found. This was the last gold-bearing country we saw until well within the Kimberley district.

In approximate long. 122° 30′ we entered the desert proper, which continued in unbroken monotony to Mount Worsnop. Vast sand-flats timbered with desert gums and a few quondongs and acacia bushes, interchanging with long stretches of rolling sand-ridges, high and steep in places, but of a far less formidable character than those met with later on; the one characteristic vegetation being spinifex.*

Throughout this part of the country cliffs, terraces, and little low tablelands of sandstone are met with. In these rock-holes may be found, and from them small watercourses run out, only to be swallowed in a mile or so by the sand. Though in no case did we find water in these creeks, yet the rains of the early winter had caused splendid herbage and green grass to grow on the banks—both excellent feed for our camels. But few natives inhabit these parts, animal life being very scarce and the water-supply precarious. During this part of the journey we had our longest dry stage, viz. thirteen and a half days, during which time the camels were without any water, and we

* Spinifex (*Triodia*) grows in round isolated stools from 1 to 3 feet high, from which wave a few straggling blades of grass. The needle-like spikes which form the stool make walking unpleasant, cause sores on the feet and legs of the camels, and before long rub all the hair off their shins.

ourselves were very hard pressed. By following natives' tracks, even those of quite recent date, we would only be rewarded with a *dry* rock-hole, or one from which it was plain the natives had just taken the last drop. Doubtless had we continued to follow tracks from hole to hole, regardless of the direction in which we travelled, we should have at length got water. But having a definite object in view, I pushed on, only using such footprints as led us on the course I wished to follow, or as near as might be. On leaving the comparatively well-watered country, we had come so suddenly into a dry and desert belt that we were hardly prepared to stand a long drought. I had carelessly omitted to have every available can or canteen filled at our last watering-place, and in consequence we suffered more discomfort than would otherwise have been the case. On leaving camp in the morning, we would travel from seven to nine hours straight on end, with a halt of no more than a minute or two to readjust nose-lines or packs, and would have neither water nor food until camp had been made at night.

Having but one riding-camel between five of us, we were on foot the greater part of the day. This training, though rather severe at first, stood us in good stead later on in the year, when the weather was hotter and water harder to obtain; and, indeed, without it I do not doubt but that some of us would have succumbed to the hardships of the great sandy desert. Besides the benefit we obtained, the practice of walking saved the camels an extra load and many a mile of travel, for when on water-hunting excursions, away from the main party, we always worked on foot, and so gave the camels all possible rest. On the thirteenth day, shortly after noon, I, leading with the compass, was rejoiced by the sight of a fresh track, and only some 60 yards ahead of us we saw a "buck" (male native) engaged in unearthing an iguana. At once we set out, and, he running, we gave chase, and, weak as we were from want of water and consequently of food also, would have had a poor chance of securing him had not Stansmore on the riding-camel cut him off in front. No doubt he had at least heard of the white man, for, after the first surprise of capture, he showed more confidence, and, quickly understanding our wants, led the way, with a guard on either hand, at a swinging pace—too fast for our camels or ourselves. Soon after sundown we arrived at the promised water; a low outcrop of conglomerate surrounded by mulga and enclosed between two sand-ridges, seen in the uncertain light, gave us high hopes, which, alas! were doomed to disappointment, for the rock-hole was dry. I was doubtful at first whether the native had led us wrong intentionally or no, but I was soon satisfied that his idea had been to bring us to a dry hole and give us the slip during the night. In this he was not successful, being too closely guarded, and thus frustrated in his design to burn through or bite the rope with which he was secured. Partly from necessity and partly to ensure his going to water in the

morning, I allowed him no water to drink. This had the desired effect, for within 5 miles he took us to a water-hole, at which we were able to obtain a splendid supply. This I named the "Empress Spring"—a name appropriate to the year of rejoicing over Her Gracious Majesty's long reign.

A very curious water this—between two sand-ridges some 1½ mile apart, a low outcrop of white limestone, in which could be seen what appeared at first sight to be a series of three rock-holes, which one might easily pass within 60 yards and not notice. On further inspection, two of the three holes turned out to be circular entrances, 2 and 3 feet in diameter, leading vertically into a cave beneath, the floor of this chamber, which is 28 feet across, being some 20 feet from the surface, and covered to a depth of 2 feet with sand. From the cave two passages run, one west and upwards, the other east and downwards. Along this latter passage one can just crawl, and at the end of it, some 50 feet from the surface, is a small pool of water, evidently a soakage from the surrounding country, and possibly a spring. Though only a small supply was visible, yet continual bailing did not appreciably lower the level of the water. Considerable work had to be done before we could get the water to the surface; the native bailed the water into a bucket, which was passed from hand to hand along the passage to the floor of the cave, and finally hauled from above to the surface.

A rough ladder formed of mulga poles and branches had served the aboriginals to come and go, and all along the passage the remains of old fires could be seen.

Surrounding the outcrop, a small patch of buckbush (or roly-poly grass) and good camel bushes exist. From the man who guided us to this water I made out the following words, which I look upon as pretty reliable, though it is very hard to be certain whether or no one is getting the correct word:—

Fire or smoke	Warroo or walloo.
Wood	Taalpa.
Dog	Puppa.
Water	Gabbi.
Nose	Woola or 'oola.
Arm	Menia.
Hand	Murra.
Hair	Kuttya.

Here we found, too, a curiously carved flat board, rounded on the back, some 10 feet long by 6 inches broad, similar to one shown in sketch, hidden away in some bushes. I do not know the use to which these boards are put, but fancy they have some mysterious significance, and are produced at "coroborrees." From the unusually careful way in which they are hidden, I should judge they were of some value.

Around Mounts Allott and Worsnop we found an oasis of some 5 or

6 square miles of fair stock country. Alexander spring we found dry, and in appearance more like a soakage in the shallow bed of a small watercourse than a spring; at the same time, not 5 miles south of the spring, and visible from the top of Mount Worsnop, the welcome sight of a fine deep clay pan met our eyes. This clay pan (Woodhouse lagoon), some 400 yards in diameter, is surrounded by sandhills, and is evidently formed from the drainage off Mounts Allott and Worsnop, and the neighbouring cliffs and hills, and into it the creek in which is Alexander spring, after spreading out on to a blood-wood flat, eventually finds its way. Teal and water-hen were fairly numerous, and one camp of natives, who retired on our appearance.

Striking north now, we shortly got into spinifex country of a new character: undulations of sand covered with a light gravel of ironstone—most barren and wretched country, only relieved by the occurrence of belts of blood-woods in the valleys between the undulations. In these belts of timber good feed might sometimes be found. Besides the blood-woods and a species of beef-wood, no timber grows, though occasional thickets of mulga are met with. This gravelly desert extends as far north as lat. 22° 40′. Between Alexander spring and the Alfred and Marie range, a few hills and low ranges of sandstone occur, but north of the latter no hard country or hills were seen for a great distance. A few small and scattered families of blacks inhabit this desert, subsisting on spinifex rats, boodies (a smaller rat), snakes, lizards, iguanas, grubs, seeds, and occasionally doves or pigeons, an emu or kangaroo (of which a few exist in the Young range) very rarely falling to their lot. For water they depend almost entirely on native wells, which yield a scanty and unreliable supply. Forced from the nature of the country, scarcity of water, and their peculiar method of hunting, viz. by burning large tracts of spinifex, to be always wandering, they seldom camp for more than a week or two in one place, and do not trouble to build any sort of houses or shelters.

Having set alight to a patch of spinifex, the natives surround the blaze as far as their small numbers will admit, and with throwing-sticks and spears knock over any rats or other animals or reptiles which are trying to escape from the burning spinifex. So soon as a patch of country has been burnt, the "gins" and "picaninnies" go carefully over the ground with a pointed stick in one hand and a wooden "cooliman"* in the other, gathering up any lizard, snake, or grub which has perished in the flames.

When the country immediately surrounding the well at which the tribe is camped has burnt out to a radius of some 4 or 5 miles, they wander on to another well. The Australian aboriginal is not noted, as a

* A small trough of wood or bark, used for either carrying food or water, or for scooping out the sand from native wells.

rule, for his provident customs, but their unwillingness to camp near a good water shows that these desert natives are not without some thought for the future. The small native wells are used first, and when these and the rock-holes are exhausted, then the more dependable waters are made use of. As well as the rats and reptiles, on which they chiefly live, they use an edible bean not unlike the bean of our English broom; this they heat on the wood coals and eat with evident relish, though to us the taste of the beans was most unpleasant, being very bitter. A small yellow seed they grind on a flat stone with a small round boulder of granite (evidently traded for from a distance), and by mixing a little water make a paste, sometimes baked into a very black and unpalatable-

IN THE QUEEN VICTORIA DESERT.

looking cake. Though feeding, as a rule, only night and morning, they sometimes sit down and cook and eat a rat as soon as killed. Everything is eaten in a half-cooked state. The process of preparing a meal is simple in the extreme; the rats are plucked and thrown on to the hot ashes with no further preparation, and are greedily devoured red and bloody, and but barely warm. A lizard or iguana calls for a further exercise of culinary knowledge: first, a crooked twig is forced down the throat, and the inside pulled out, which dainty is thrown to any dog or child that happens to be near; the reptile is then placed on hot coals until distended to the utmost limit that the skin will bear without bursting; then it is put on ashes less hot and covered with the

same, and after a few minutes is pronounced cooked and ready for the table. The old gins usually do the cooking, and keep up an incessant chattering and swearing the while. They drink twice a day, on going out and on returning from hunting, and swallow an enormous quantity of water, blowing themselves out to a noticeable degree. Using no shelter or "mia" of any kind, they sleep two or three together in a hollow scraped out in the sand; between each hollow a little fire is kept burning all night (in the cold weather), replenished from a bundle of sticks and roots kept handy for the purpose. To break the force of the wind, a fence is made of uprooted tussocks of spinifex some 2 feet high, and behind this they lie coiled up higgledy-piggledy like a litter of pups. Poor as is the supply from the native wells, they last the blacks a considerable time, as, except for drinking, they make no use of water. From what I have seen of these wells, I judge them to be simply rock-holes which have been filled in and covered by the general deposit of sand. In some few there seems to be a very slight soakage, but as a rule, when we had finished with a well, it presented the appearance of an empty rock-hole from 12 feet to as much as 30 feet in depth.

There being no soakage into the well, the sand immediately round it is just as dry as that elsewhere, and in consequence one sees no grass or herbage growing near the mouth, as would be the case were the ground damp. Except for native camps or tracks, one has no guide whatever to these holes, and might easily pass within a few yards without seeing them. The plan on which we worked was as follows: Every day or so we would see smokes arising in various directions (usually at about 9 a.m.). Choosing a smoke in the direction nearest to that in which I wished to travel, I would take a bearing with prismatic compass, and travel on that bearing until the fire or the burnt patch of country was reached. Sometimes these fires, though appearing quite close, would prove to be 30 miles off, and pretty accurate steering was required to hit off the exact spot where the fire had been. Having reached the spot, we would, if possible, surprise natives whilst they were hunting, and secure one or more; or, failing that, we would pick up the tracks of the lighters of the fire, and follow them until their camp was found. This often entailed hours and hours of patient search, for so many footprints surround the burnt country that it is hard to single out the tracks leading campwards. On our approaching a tribe, astonishment and awe would keep them spellbound for a few minutes, and then up and away they would run helter-skelter, leaving everything behind them—some hiding behind bushes, others climbing into trees, and a few of the bolder spirits awaiting our arrival, with but ill-assumed confidence, after the first retreat. It would often happen that they had only one or two of us to deal with, the main party being behind, and on such occasions they were bold and insolent, and sometimes ready to dispute our unceremonious arrival into their country. A young "gin" (girl) or small

boy would always show us their camp and well without much hesitation, a "buck" sometimes, but an old lady never; they are the hardest to manage, and are quite untamable, yelling and screaming, kicking, scratching and biting, spitting, and presumably cursing, until one is by no means sorry to be quit of them. Having secured a native, or two if possible, for they fret less in company and sooner get over their fear, should he take us to water at once, well and good; if not, we would continue on our course for the rest of the day, taking the captive with us. A single night without water would soon bring him to reason, and one could be pretty sure that in the morning he would be only too anxious to get started. When thirsty they travel very straight and at a great rate, with long swinging strides, often carrying a short stick behind the shoulders like a "backboard." Though apparently there is little advantage in this, it will be found that the position one's arms take expands the chest and opens the lungs, and certainly makes rapid walking easier.

On starting, I would make the native point out the direction of the water, and take a bearing; as a rule they deviate but little from the direction pointed out. Sending the captive on ahead with one of us to prevent his escape, I would walk behind the line, and so watch our course.

These captures were a necessity—matter of life or death for us,—our guides were never cruelly dealt with, but, as a rule, dismissed with presents, and well enough contented.

Arrived at a well, our troubles, so far from being over, were only just beginning, and long hours (often days and nights without rest) of hard work lay before us before we could have any water for our camels or ourselves, though we might be able to get sufficient to keep us going whilst we worked.

On first acquaintance with these wells, a novice's impulse would be to dig out the sand until the bottom was reached, and wait for the water to soak in, in which case he would be woefully disappointed, for the water is held a long time in the sand, and, there being no soakage from the surrounding country, every shovelful of sand would contain an appreciable amount of water, and finally he would be left with a rock-hole cleaned out certainly, but cleaned not only of sand, but of water also. To sink by degrees and bail the water as it oozes from the sand above is equally out of the question, for every shovelful taken out only leaves room for the surrounding sand to fall in. Therefore, without some means of holding back the sand, one is placed in the wretched position of finding and seeing the water without the power of getting it. The natives use so little water at a time that, as the water becomes less, they are able to scoop out the sand very gradually, and plaster it round the sides of the well, and so prevent the inrush of sand. As often as not, they do not bail the water at all, but suck it up from the sand through a bunch of grass.

Luckily, amongst our gear we had two galvanized iron boxes made with deep lids, on the same pattern as those of a commercial traveller; by cutting the top of the lids off, we were able to make a sort of "caisson" without damaging the rest of the box. By sinking these in the sand in the well, by digging out the sand contained in them, and by patiently waiting with a pannikin for the small trickle of water soaking in from the sand contained between the outside of the boxes and the sides of the rock-hole; and then again forcing the boxes lower and continuing the bailing process, we were able to drain the native well of all the water it contained, and by the time we had finished, an empty rock-hole surrounded by sand would remain, with only a few traces of moisture at the bottom.

The water from these wells always had a nasty taste, and on boiling a thick scum would come to the surface. Tea made with it turned quite black. Iron the water certainly contained, but, besides that, the remains of birds, lizards, sticks, and other rotting vegetation, and the flavour left by countless aboriginals go to make a very remarkable beverage.

So wretched a supply do these wells yield that, after sometimes as much as four days' and nights' constant work, we would be only rewarded by 100 to 180 gallons; we were seldom able to fill the camels and the water-cans at the same well, and week after week for nearly five months it was one continual battle for water.

The weather was now very hot for the time of year, and the temperature increasing daily, though in the early morning a cold east wind blew that freshened us for the coming heat of the day. We passed over large tracts of burnt country, from which the strong winds were continually blowing clouds of black dust and ashes—little spiral winds, small "willy-willies," being of common occurrence, when a black cloud would suddenly rush up into the air, and many feet overhead bunches of spinifex, small branches, and grass would be whirled round in rapid confusion.

On September 19, after leaving Family well in lat. 22° 40′, we entered the most miserable and barren desert of sand-ridges it is possible to picture, and from this date until November 16 we were never out of sight of a sand-ridge. From lat. 22° 40′ up to lat. 20° 45′ there stretches a vast howling wilderness of high spinifex-clad ridges of red sand, so close together that in an average day's travelling of seven hours we would cross some sixty ridges, so steep that as often as not the camels would crest them on their knees, and so barren and destitute of vegetation (saving spinifex) that even camels are hard put to pick up a living. The average height of these ridges from trough to crest I should judge to be at least 50 to 60 feet vertical.* With almost heart-breaking regularity, they keep their general trend of north by east and south

* Colonel Warburton estimated the average height of sand-ridges seen by him to be over 80 feet. Gregory gave from 30 to 60 feet as the average height of those seen by him east of the Oakover river.

by west, which made our travelling the more difficult and tedious as, from our northerly course, we were always crossing the grain of the country. As well as the troughs and waves, so to speak, the ridges seem to run in great undulations, so that for half a day, or a day perhaps, we would reach the top of one ridge only to find a higher one in front, and, similarly, the next part of our journey would be over ridges gradually sinking before us. Words can give no conception of the ghastly desolation and awful, hopeless dreariness of the scene which meets one's eyes from the crest of a high ridge. The barrenness of the sand is only intensified by the few sickly and shrunken gums that are dotted over it, and everywhere spreads spinifex; true it is, though, that even this poverty-stricken plant has its uses, for it serves

CONICAL HILL AT ENTRANCE TO BREADEN VALLEY.

to bind the sand and keep the ridges for the most part compact. Where the spinifex does not grow—that is, on the crest of the ridges, probably kept back by the wind—one realizes how impossible it would be to travel for long over dunes of loose sand.

In such country as this one can appreciate the many good qualities of the camel. Poor kind and noble-hearted beasts, with what patience and undaunted courage do they struggle on with their loads, never complaining, and never giving in until they drop from sheer exhaustion! Night after night we searched in vain for any feed; after vainly wandering in their hobbles, picking up a few scattered mouthfuls from a dry and shrivelled thistle-like plant (good feed when green, and full

of sticky white juice), tired nature would at last give in, and empty-stomached and well-nigh worn to death, they would lie till morning, until again dragged relentlessly across several dozen more of ridges.

All through this wretched country small families of natives (eight or nine together) exist. Contrary to what one would suppose, they are by no means small or ill made; rather the opposite, some "bucks" being upwards of 6 feet high, and on the whole a better race than those seen further south about the Eastern Coolgardie fields. And the reason is not far to seek, for with the southern black it is either a feast or a famine—that is to say, that once in a while he kills an emu or kangaroo, and in the mean time lives upon "bardies" (large white grubs found in the roots of a shrub), and so forth; whereas the desert nigger never knows want, and has always a full larder, though it may contain nothing better than rats and lizards. On their return from hunting, one sees the bucks marching home with the spoils of the chase strung by the tail in the hair girdle that they wear round their waists, and the ladies following behind with "coolimans" brimful of bob-tailed lizards, sleeping-lizards, rats, and other choice delicacies. These rats live upon the roots and the young plants of spinifex, and, so far as I can see, do not require water; supposing that they were able to go down to the bottom of a native well, and climb up again, which it would not be possible for them to do, they would certainly leave well-beaten paths leading to the water, and these one does not ever see. Spinifex contains a considerable amount of turpentine, and from the roots the natives make a kind of gum, so that perhaps sufficient moisture is obtainable from it to keep the rats alive.

Whilst hunting or travelling, the natives get some satisfaction, and I suppose a certain amount of nourishment as well, from the pulp of a certain plant which they chew, something of the nature of "pitcheri" used by the Queensland blacks.

The natives are by no means free from disease, and both at Family well (lat. 22° 40′) and at the Jew's well (lat. 19° 40′) we found natives, one a woman, the other a man, suffering from some horrible outbreak of running sores, covering the arms, legs, chest, and back, accompanied by a swelling of the joints. We doctored them with Stockholm tar and linseed oil (a mixture used for mange in camels), which seemed to relieve them somewhat. Disease of the eye is not uncommon, one poor little boy having the inner corner of either eye completely eaten away, leaving a cavity into which one could easily put the point of one's thumb. At a native well (lat. 21° 40′) was a stone-blind native, and from what we could gather he had been always so.

Wounds and scars from burning are of common occurrence, from the fact that they sleep so close to their small fires, and owing to the careless manner in which the babies and children are thrown down and left close to a fire, to roll in and have an arm half-charred or to be merely blistered

and roasted, as chance may direct. The mothers care very little for their children, and the elderly ladies especially will show far more affection for a litter of domesticated dingo pups. When a tribe has been in full retreat on our approach, I have seen an old gin stop and turn back to their camp to pick up some small puppies; yet when, as sometimes happened, we had a small boy in captivity, no attempt at rescue was made.

Amongst the weapons and treasures in a camp are nearly always found several bundles rolled in a covering of bark and tied round with hair string. In these bundles they carry all sorts of finery (in the shape of plaited bands of string for the arm or wrist, "sporrans" or tufts of dingo hair, or the tips of rats' tails, necklaces of beans, and so forth), and valuables—carved sticks, flat or round, as shown in sketch; pieces of quartz or opaline for making tools for carving; a sort of red ochre and another white substance, from which they make paint for decorating themselves; bunches of emu's, crow's, or hawk's feathers; a few bones of birds or rats for putting through the nose; and numerous other odds and ends. As evidencing the extent to which they trade from one to the other, I mention you that in camps as far in the interior as Helena spring and Family well we found such things as pearl-oyster shells (used slung round the waist for a "sporran"), lids of tin match-boxes, an iron tent-peg, a piece of a saddle-tree, piece of glass (carefully packed in a case of feathers and grass), and tomahawks made from old iron, apparently part of the tyre of a dray-wheel. This trading is all the more curious when one considers the small extent of country to which one family is confined, and also the very rapid changes in language. I should say that about 70 or 80 miles would be the very longest distance that any native could travel without leaving his own particular district. On our return journey, two men caught near Mount Elphinstone knew no waters beyond Stansmore range, where we liberated them. I think it probable that there are no natives who are entirely ignorant of the existence of the white man, though doubtless to many we are as little known as the pigmies of Africa were to the ancients.

The blacks nearer settlements add the word "womany" to their English vocabulary. Again, at Helena spring the native that we had with us would look on quite unmoved at us as we shot the small tufted pigeons, which came to water in fair quantities; whilst further north, at Jew well, on my picking up a rifle there was a general stampede of the natives, who surrounded us as we worked at the well, and who were somewhat impeding us by their inquisitiveness.

Helena spring, a small basin in a surface outcrop of limestone formation, fed from some subterranean source, is surrounded by a little oasis, not more than 400 yards wide, of splendid herbage of thistle-like appearance, and numerous good camel bushes; outside this welcome spot, away to the horizon on all sides stretches the desolate sea of sand-ridges, at the time of our journey looking all the more inhospitable

and dreary from having been recently burnt. The basin, through the bottom of which the water rises, contains no more than 70 gallons; on exhausting this supply the water will be found to rise again, and before long attains its former level nearly flush with the surface. Here we camped some few days, allowing the camels to enjoy to the full the good feed and unlimited supply of water; not sorry ourselves for a few days' rest, occupied in washing, mending clothes and saddles, diary-writing, and the numerous little duties which had necessarily been somewhat neglected. Who can picture the satisfaction and relief of finding one's self at a good water, easy of access and unfailing of supply, after weary days and nights of toil in the wretched native wells? What a Godsend this spring was to us and our tired camels! Without it 'tis hard to say how we would have fared, for the camels were well-nigh exhausted from the heat and want of feed, and had been coaxed along with the greatest difficulty. The sand during the day became so overpoweringly hot that the camels would not stand still, and on a necessary halt to adjust a pack or nose-line, some would break away and drop down in the wee patch of shade afforded by some small bush or shrub, some would lie down, and those that stood would be continually lifting their feet. The aboriginal we had with us suffered more from the heat than we did, and would hurry forward when a tree came in sight, straining at the rope or chain like a dog at his leash, throw himself in the shade of the trunk (for the few ill-leaved branches afforded no shade), and with a stick dig a small hole in the sand, then from a foot or so below the surface he would bring up handfuls of cool sand, with which he would anoint his legs and arms. Sometimes he mixed with the sand his own urine, plastering the mud so formed over his head and body. To two dry wells he took us, until our patience was nearly exhausted, and we resorted to the unfailing argument of allowing him no water until he guided us aright. The outcome of this was the finding of Helena spring, on arrival at which our friend was most anxious to plunge into the basin of water, so eager was he to alleviate his thirst.

Words got from Natives near Helena Spring.

Native.	English.
Goondooroo	Eagle-hawk.
Waaldi	Gum tree.
Godadjudah	Spinifex.
Nooah	Sand.
Warroo	Smoke, fire, or firewood.
Gabbi	Water.
Puppa	Dog.

Native Words near "Point Massie."

Native.	English.
Yowie	Water.
Yurrie	Water.

It may sound cruel to keep a man thirsty for so long, but it must be remembered that our lives depended on the natives showing us water, and if unwilling to do so they had to take the consequences; and for that matter, though in such a case they had no water for perhaps thirty hours, yet we, working and walking, had no more day after day than would just suffice to keep body and soul together.

From latitude 20° 50′ to latitude 19° 20′, the monotony of the desert was somewhat broken by the occurrence of detached blocks and tablelands of sandstone (the Southesk tablelands) which, in the distance, had the appearance of bold headlands, cliffs, and points such as one

VALLEY AT HEAD OF WHICH IS GODFREY'S TANK, A LARGE POOL IN A DEEP ROCKY GORGE.

sees on the sea-coast. These are in some cases some 200 feet above the surrounding country, with sheer rocky faces and more or less flat tops, from which there stand out conical peaks, and hills like so many gigantic mole-hills. The flat top gradually slopes away from the highest cliffs, until at a distance of some 3 to 6 miles the sandhills and the summit of the tablelands are one. Barren of all trees—except here and there a fig which somehow manages to live with its roots, some finding a foothold in clefts in the face of the rock, and some hanging into space—and innocent of all vegetation but spinifex, these hills present a most forbidding and desolate appearance. In the valleys between the headlands and around the foot of the cliffs a narrow belt of fair grass grows, and, torn away by occasional thunder-

storms, rough and steep little gorges and glens give rise to narrow though deeply scored watercourses, which with their fringes of bushes and shrubs are soon swallowed by the all-devouring sand. From the appearance of these little creeks, I should judge that very occasional, but very violent thunderstorms must visit this region. The beds overgrown with spinifex go to show that running water is of infrequent occurrence, whilst the upturned roots of trees and large boulders and broken fragments of rock strewn about in wild confusion, and the way in which a channel has been torn out through the sand until the bedrock is exposed beneath, give one the impression that some powerful storm-agency must sometimes be at work. Whilst we were amongst these tablelands the weather was broiling hot, and night after night we experienced terrific thunderstorms, but, alas! unaccompanied by rain. Every evening the clouds would bank up black and threatening, the heat would be suffocating, making sleep impossible, lightning tearing across the sky; and then, after all this hope-inspiring prelude, several large drops of rain would fall—no more—the sky would clear, and the performance be over, only to be repeated the coming evening.

At the head of one or two gorges we found some large rocky pools, usually situated underneath an overhanging ledge of rock. The largest of these (Godfrey's tank), situated in a position almost inaccessible to camels, I estimated to contain, when full, about 40,000 gallons. As we found the hole, it held sufficient water to enable us to have a good bathe before leaving it.

From Godfrey's tank to Mount Bannerman there was another uninterrupted stretch of sand-ridges, and one well with a good supply (lat. 19° 40′). To this we had tracked a tribe of some twenty blacks, about which the most noticeable thing was their pronounced Jewish cast of features—fine, big men most of them, very inquisitive and bold. To the east of this well a belt of black desert oak stretches, the first we had seen.

Near Mount Bannerman we had our first mishap, losing three camels from poison-plant. I could not discover which bush it was that had such fatal properties, and could only be thankful that we lost so few. One day past Mount Bannerman, and the desert of sand-ridges was behind us. Here, in the shape of horse-tracks, we saw the first signs of white man since sighting Forrest's pile of stones on Mount Allott. Our journey through unknown country was now at an end, and along the banks of the creeks and rivers in the Kimberley country, into which we shortly entered, our path was through pleasant places—shady trees, long grass, and frequent pools of water in the shingly beds of the creeks (alive with fish and ducks), made a welcome change after the awful desolation of the desert. This Kimberley country is too well known to need any further description here. Let it suffice that we followed up the Margaret river to the crossing of the Derby—Hall's

Creek telegraph-line, and along the latter to Hall's Creek, the official centre of the Kimberley goldfield. Our joy and self-congratulations at having overcome the dangers and difficulties of the desert were doomed to a short existence, for a most deplorable accident, resulting in the death of poor Charles Stansmore, took half the pleasure from our hard-earned victory. For some time past, having exhausted our supply of meat, it had become customary for one of us to carry a shot-gun and follow up the opposite bank of the river, or walk wide of the line of march, on the chance of shooting a kangaroo, of which we saw a fair quantity when once out of the desert. On November 30, Stansmore was carrying the gun, and on descending a steep face of rock his heels slipped, the gun fell forward, striking the hammers on the rock at his feet, the cartridge exploded, and the charge entered his body just below the heart, death being instantaneous. I cannot describe our sorrow at the side of poor Charlie's lonely grave. So good and true, and a man in every sense of the word. 'Twas better thus than a lingering death from thirst in the desert, and yet how hard it seemed—to die on the edge of the promised land, with the bad country passed and left behind!

We reached Hall's Creek on December 4, having travelled some 1400 miles, and here we remained until March 20, the guests of Mr. Cummins, the extremely hospitable warden.

Hall's Creek is the official centre of the once populous Kimberley goldfield. This goldfield was discovered in 1882 by Mr. Hardman, government geologist attached to a survey expedition under Mr. Johnston (now Surveyor-General), who found "colours" in numerous localities; but it was left for prospectors to find payable gold; and early in 1886 one of the largest and most unprofitable "rushes" known in Australia set in for the newly-discovered alluvial field. The sinking being shallow, what ground there was was soon worked out, and before long the "rush" set back again as rapidly as it had come, and the goldfield was condemned as a "duffer," and left to the few faithful "fossickers," who have made a living there to this day. The alluvial gold was the great bait, and of this but little was found, and to reefing no attention was given, and so, at the present time, we see miles upon miles of quartz reefs, leaders, and blows untouched and untested as they were before the "rush" in 1886. No one can say what systematic prospecting might disclose in this neglected corner of the colony. There are many countries less well favoured for cheap mining; for one thing, Kimberley is blessed with an abundant rainfall, and the district contains some of the finest pasture-lands for cattle in the continent of Australia. The roads, except during the rainy season, are good, and cartage from the port of Wyndham (200 miles) should not be a very costly item. A scarcity of suitable mining timber, the remoteness of the district from settled parts, and the bad name with which it is loaded, are the disadvantages under which the goldfield labours. For all that,

two batteries are working at the present time, and a rich find by some old "fossicker" is not so rare.

The present mining population of Hall's Creek is about twenty. This is augmented occasionally by the influx of "overlanders" from the Northern Territory and Queensland.

The gold-bearing country is cut off to the south-east by what is locally known as the "Sandstone," a bluff wall-like range named the "Albert Edward" range. In the same direction, between the Sturt and the border, "colours" of gold have been found, and the existence of this narrow auriferous belt, well known to the present prospectors on Kimberley, to the eastward of Messrs. Stretch and Week's station on the Sturt, gave us faint hopes that the same belt might be met with to the southwards. But to this, I may say, we pinned little faith, and beyond the feeling that we were to some extent benefitting the community in general by coming back through unknown country in the place of an uninteresting and useless return by the coastal stock track, we had little thought of any practical advantage resulting from our work, unless it were the opening up of a stock route between the cattle country of Kimberley and the southern goldfields; of this I had but little hope after our former experiences. It needs no expert to say in most decided terms that such a route is utterly impracticable; seeing that, when in the best of seasons it would be a matter of extreme risk to bring over a mob of, say, one hundred camels, what chance could a herd of cattle have of getting even a quarter of the distance? Any one reading the briefest account of the style of country encountered by us will, I think, be of the same opinion as myself.

We left Hall's Creek on March 22, on our return journey. There is no place that I shall so long remember for its kindness and hospitality as that out-of-the-way settlement.

Our party consisted of Messrs. Breaden and Massie (companions of my former journey), two black boys (one our faithful "Warri" and the other a Sturt creek native, "Tiger" by name, an excellent boy, but one so devoted to his own comfort that he left us on the first signs of the desert), eight camels, and three horses. By using canvas bags as well as our iron casks, we were enabled to carry a large quantity of water (about 100 gallons), and by allowing the horses one bucket (3 gallons) apiece nightly, we managed to keep them alive for the extraordinary periods of eight, nine, and ten and a half days; extraordinary, not so much because of the short allowance of water (for of course horses, when on good feed, have been known to live an almost equal length of time without any water), as on account of the almost total want of feed and the extremely trying nature of the country they had to cross. In many places the utter sterility of the country would not allow even the spinifex to grow its accustomed tops of coarse grass, and on more than a few occasions both camels and horses were

forced to content their hungry stomachs with the prickly stool of that everlasting and useless plant.

Crossing those splendid grass plains (the Denison) discovered by Gregory, we reached Sturt creek, which that famous traveller has so well described, that little need be said about it here. Following the track down the creek, we arrived at Mr. Stretch's homestead on April 1. This is the most southerly settlement in the East Kimberley district. The Sturt, which up to this point had had the appearance of a broad line of blue-bush * swamps and flats, with hardly a defined channel to mark its course, here becomes confined between two rocky ridges of sandstone, the result being a fine water-hole some 5 or 6

NATIVE CAMP.

miles long, and, so far as I remember, about 300 yards across. Mr. Stretch accompanied us down the creek as far as the junction of it and the "Wolfe" (named by Mr. Stretch), which occurs some few miles north of the border of the Kimberley district. Above the junction the same swamps and flats, alternating with large rock-bound pools wherever a sandstone ridge runs across the course of the creek, exist. Below the junction the combined channels take on themselves the character of the Wolfe, which, in common with all the Kimberley creeks seen by us, is fringed with large gums, Leichardt pines, and Bauhinia trees. At the junction of the two creeks, the Wolfe is

* Atriplex.

of the greater volume, though the Sturt is certainly deeper; and, seeing that the Wolfe (which rises somewhat on the opposite fall to Christmas creek and the Mary river) floods twice or thrice a year, whereas the Sturt runs its entire length but once in every three or four, it must, I think, be to the former that the lakes (Gregory's "Salt sea") owe their existence. In any case, the combined waters of the Wolfe and Sturt have made but an insignificant channel between them, and one can hardly credit that this creek has a length of nearly 300 miles. From the junction downwards a war between the desert and the grass lands is waged for the supremacy of the river-banks. For miles the sandy channel, not one chain wide in places, is hemmed in on either side by desert gums and spinifex, and once out of sight of the creek, one might be in the midst of the wilderness for all the benefit the surrounding country receives from the water. But again lower, noticeably about the latitude of Mount Müller, the grass plains gain the day—and a very pretty bit of country it is, too, especially so under the conditions in which we saw it, when the creek was still running, and wherever, as in many places, it had overflowed its banks, clay pans and lagoons of beautiful clear water appeared, and on all of them teal and whistling duck in profusion. On nearing the lakes, the creek assumes so dismal an appearance, and so funereal is the aspect of the dead scrub and dark tops of the "boree," that one wonders that Gregory did not choose the name of "Dead" instead of "Salt" sea for the lakes he found. A curious point about this part of the creek is that stretches of salt and fresh water alternate. On unsuspectingly camping one night on its banks, we were forced, on tasting the water, to turn back several miles before we could get any fit to drink. The lake itself is a fine sight. To see so large an expanse of water (even though salt) is a rest for the eyes after so many miles of the unending sand and spinifex. The water of the lake, though used by the natives in certain parts, was too salt for our liking, so we camped on a high bank overlooking an estuary opening out into the large lake some 5 miles further south. There one can easily understand the reasons which caused Gregory to call it a sea rather than a lake, the more usual term, for anything more like the low-lying arms of the sea, such as those in Southampton Water at home when the tide is out, it would be hard to imagine. Even the smell of the seaweed and muddy ooze is not wanting, and, to complete the picture, myriads of wild-fowl cover the sandbanks and the surface of the water. In the early morning so dense is the crowd of shags, ducks, pelicans, snipe, and other birds, that to say that there was acre upon acre of wild-fowl would not be wide of the mark; but in spite of their abundance they are not easily shot, their very numbers ensuring the watchfulness of some of the various flocks. Large camps (perhaps two hundred in all) of natives were dotted round the lake, and on our first arrival we had an escort of

nearly a hundred yelling and excited blacks—mostly men and boys, for, though very ready to talk of their "womany," they were careful to keep them in the background. They were peaceable enough, anyway, and I made them take one side of the water, while we camped on the other, and won their hearts by shooting pelicans for them, though the ungrateful fellows took our boy "Tiger" from us, and would have actually murdered poor "Warri" had he not been too clever for them. Here we saw some of our former Jew acquaintances, who recognized us at once; one old man, whose son's eyes I had doctored with lotion, was greatly pleased, and told us through Tiger that the boy's eyes were all right again. We questioned them about Wells and party, but of this they seemed to know little, though they knew of the murder of a white man by a native down the Fitzroy, an occurrence of recent date. They also told me of some white men who were speared in a cave a long while ago, somewhere about Christmas creek. Hoping to find some interesting facts for students of ethnology, I asked the old man his name. He said he hadn't got one, which seems strange, but he should know best, so I christened him "Jacob," for the benefit of the next person who recognizes in him the characteristic features of the Jewish people.

These Sturt natives are fine, well-set-up men for the most part. The abundance of game and fish no doubt accounts for their good appearance. Fish, from what I could gather, is not a common article of diet amongst them, for, having nothing in the shape of hooks or nets, they are unable to negotiate the deep water, and only catch fish on the rare occasions on which they find them up the creek in the shallows. Out of these they sweep them with a sort of fence of branches, which they drag through the pools on to the banks, the water running back through the sticks, and the fish being left high and dry on the sand. They find also quantities of mussels, which we thought disgusting in taste, but they greedily devour them when baked in a heap of ashes.

Using "Tiger" as interpreter, I got the following words from the natives, which I look upon as reliable. Without much trouble one could make up a lengthy vocabulary, as the blacks are only too fond of talking, but in most cases their information is untrustworthy, and it was only after testing several natives with the following words that I satisfied myself that they were pretty correct:—

English.	Native word.
Gregory's Salt sea ...	Burrow.
Fresh water	Nappa, or yowie.
Salt water	Moorabba (compare Hunt's Slate well, near Lake Lefroy, which is sometimes salt, called by the natives "Moorabbi").
Creek	Gilli.
Fire	Walloo, or warroo.
Fish	Yagoo.
Mussel	Bambirri.
Whistling duck	Tchibillu, in imitation of the cry of the bird.

English.	Native word.
Pelican	Coya.
Moon	Young'un.
Star	Gigi.
Sun	Brung.
Southern Cross	Wun-num.
Dog	Puppa.

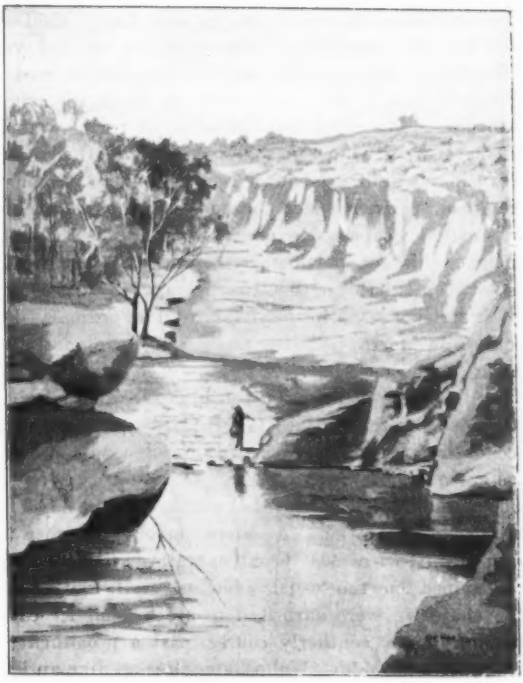
We left the lakes on April 20, shaping a course to take us generally through the country mapped by Warburton, though I did not actually steer for any of his points or waters, knowing that doubts as to the accuracy of their position existed; and I may say here, though it is rather ahead of our journey so far, that our course should have taken us right through the salt lakes marked by him close to the border, yet no such lakes crossed our path. But in the same latitude as Lake White, and some 17 miles to the east of the position given to that lake by Warburton, we passed close to a lake the general description of which would agree with that of the first-mentioned lake: sandhills and spinifex right up to the edge of the lake (salt and dry, of course), and fringing the eastern shore a high tableland of sandstone. After striking this lake we turned west to the Stansmore range, and so, had another lake existed in that latitude, we must have seen it, which we did not. Now, if I am right in saying that Warburton thought he was 17 or 18 miles further west than he was in reality, this would account for his failure to connect with Gregory's traverse in 1856 at the Sturt lakes, and also for the failure of two parties to locate certain of his positions. The one was Mr. Buchanan's, who travelled a few days into the desert beyond the Salt sea, and returned quite satisfied that his idea of a stock route between the Sturt and the Oakover was impracticable. Mr. Buchanan looked in vain for Lady Edith's lagoon, which is marked as only 50 miles from the lakes. The other party was that of Mr. Smith, who attempted to cross the desert to the Oakover, but returned after penetrating it only a short distance. Mr. Smith told me that he thought he had located "Bishop's dell," and this he placed due south of the larger lake instead of south-south-west, as shown on Warburton's route.

Mr. Wells (the leader of the Calvert expedition), too, eventually found Joanna springs some 20 miles east of Warburton's position, therefore I am inclined to think that Warburton's work wants shifting bodily on the map some 17 or 20 miles to the east. Considering the sufferings that he and his party went through, one can only marvel that Colonel Warburton was able to keep any sort of reckoning.*

On leaving the lakes we got almost at once into desert country, a belt of "boree" scrub intervening; but not into the sand-ridges until

* Out of seventeen camels with which Colonel Warburton started, sixteen died. Some succumbed to hardship, and the rest were killed for food. Colonel Warburton lost the sight of his right eye. Neither he nor his son, nor, indeed, any member of the expedition, would have reached civilization but for the faithful courage of Samuel Lewis.

about lat. 20° 35′, when we took a turn to the south, leaving a prominent single hill to the north of us. Beyond the lake we got water in a small gully running down a tableland, but after that our old method of steering for smokes, surprising camps, and running down the natives had to be resorted to. To the westward of the big hill (Mount Elphinstone) we surprised two natives as they hunted, after steering for their fire for no less than two days—for, of course, the actual smoke only lasts a few hours. One was an exceptionally fine man, and would be reckoned large in any community, the other older and smaller. We



FISH-POOL IN JANET CREEK.

kept these men for some days, and they took us to three good waters: a splendid soak not far from Mount Elphinstone, and some pools in rocky, desolate glens in the Stansmore range. Except that they did not seem to value each other's society—for we never saw them conversing—they appeared fairly contented so long as our course coincided with their wishes. No doubt they took us to one dry well, but that was my fault, for, on the old man pointing one direction and the younger one another, I chose the one that suited us best, and, in

consequence, arrived at a dry hole. When I unloosed them they were unwilling to go, until I pointed out our proposed course—then about south. This at once decided them—off they went. Seeing their indisposition to accompany us, we were prepared for a stretch of bad country—nor were we disappointed. Till now the sand-ridges had been bad enough—high, red, barren, running right up to the ranges—where, by the way, several good creeks take their rise, only to be engulfed in the greedy sand; though, judging from a line of large gums which I could follow with field-glasses for a great distance, I fancy that one at least must reach the lake, which I take to be Lake White. Between the Stansmore range and Lake MacDonald (and beyond that too), the sand-ridges beat anything we had yet seen for sterility, frequency, and height; and Warburton showed discretion when he turned back in 1873, and made up further north before attempting to cross. As usual, the difficulties of travel were intensified by the obstinacy with which these ridges hold to their east and west direction, causing us infinite labour in having to cross the country "dead against the grain." Mr. Breaden counted the ridges as we crossed, and in one day's march we passed over no less than eighty-six ridges. I do not remember this as a particularly bad day; in fact, we got a good many flats between the ridges that afternoon, so that we may take it as an average experience. As to the distance in an ordinary day's march of eight hours—uninterrupted, except when mounting and dismounting to tie together broken nose-lines, or to give each other a spell at steering—(reckoned, when travelling due south, as the difference in latitude), we did not cover more than 12½ to 13 miles, though probably our actual mileage, reckoned up and down the switchback ridges, would be more than half as much again. In lat. 22° 19′ we got a change: black desert oaks in place of the more usual stunted gums, and one day's flat travelling. Here, too, we made more captures; amongst them a very small man, almost a dwarf, with most peculiar wall-eyes like a Skye terrier. They were camped on the usual wretched well, and amongst their spoils of the chase we were surprised to see a domestic cat—a black one. Continuing on a southerly course, past a prominent bare hill capped with quartzite (Mount Webb), standing up like an island from a surrounding sea of sand and scrubs—crossing the Winnecke hills of Tietkens (1889), we struck the north-east corner of Lake MacDonald; this, in common with all the so-called lakes of the interior, is merely a vast expanse of mud and salt. The sand-ridges hereabouts are comparatively low, and have some feed on them, but high enough to so limit one's view that we only once got a sight of the lake. From this point we marched over samphire and salt-bush flats, and finally across the Davenport hills until again into the sand, when, just on the edge of the ridges on the east slope of the hills, we came on a native camp, and Godfrey on Monk, the only horse able to go out of a walk,

succeeded in stopping one of the men—a fierce, well-made native, with an enormous length of hair and beard. After lengthy consideration he guided us to their water-supply—an enormous cavity in the sandstone rock, some 30 feet deep, and filled, to three-quarters of its depth, with sand. I estimate the capacity of the hole at 4000 gallons, yet our unremitting labours of nineteen hours' duration were rewarded with less than 90 gallons.

The next day, with the help of the native, who pointed out our course, we found a splendid rock-hole brimful, with more water in it than we could use in four days. How that black man must have laughed to himself as he watched us slaving away the previous day! This

AMONG THE SOUTHERN TABLELANDS.

was one of the many occasions on which a fourth man would have greatly assisted us. For on our first journey, before poor Charles Stansmore died, whilst three worked on the well, the remaining one and the boy could be hunting for more water.

In the native camps here we found barbed spears and a generally better class of implements. These people, I fancy, only make occasional desert trips away from the well-watered country over the border. Amongst other treasures we found a piece of glass bottle (evidently used for fining down and smoothing spears, etc.) most carefully tied up in a grass-woven case, opening like an oyster, and lined inside with feathers. In the same camp (this was near Mount Webb) we got a

"sporran" consisting of a pearl oyster-shell or large conch shell, also one formed from the top portion of a human skull, whether that of a white or black I cannot say; a piece of the covering of a camel-saddle was also in use as a sort of sack for carrying their belongings in.

From this last rock-hole we kept a southerly course until about the centre of what was formerly marked as the probable outline of Lake Amadeus, this side of the border; no lake, however, was to be seen, only sand-ridges. We now turned westwards, running parallel with the Rawlinson and neighbouring ranges, though too far off to see them, except from one point, where we got sight of a large and prominent block of apparently bare red sandstone standing up alone on the horizon. This should be Mount Skene from its bearing, and distant some 40 miles from where we saw it. Soon we were to see our last smoke and make our last capture, for from the day of reaching the "Deep rock-holes," lat. 24° 20′, long. 127° 20′, we saw no more smokes, and but few natives or tracks. From a point three days east of these rock-holes to a point about an equal distance beyond them in a south-westerly direction, we encountered the most utterly barren and miserable country it has been our lot to see. Camp after camp and never a bite for camel or horse; no animal life, not even the usual spinifex rat (and here I may mention that the rats went out with the smokes, and south of latitude 24° 20′ we saw hardly any), no birds, no natives, no tracks, no vegetation save the everlasting spinifex, and that in its most decrepit state; a few stunted gums or desert oaks stand in their solitude on the crests of the sand-ridges. Luckily, this wretched wilderness was near an end, for, a little south of the end of the Rawlinson range, to our delight we came once more into open country—the undulating gravelly desert * first crossed from west to east by Giles, and found by us in 1896 to extend northwards to lat. 22° 40′. Steering a due south-west course, with Woodhouse lagoon as our ultimate destination, we had splendid country for rapid travelling—undulating desert of gravel and spinifex, with occasional thick mulga scrubs. Here we saw but very few natives' tracks, and those which we followed took us constantly to dry rock-holes. Even fresh tracks merely led us to recently exhausted reservoirs. At length we found a serviceable hole, from which we got between 20 and 30 gallons.

About lat. 25° 30′ we sighted what I took to be a long, low range of hills, and by my reckoning the Sutherland range; but on nearer approach we found that the supposed ranges were only high sand-ridges—cut off suddenly by a line of salt lakes and samphire flats, which, running in a southerly direction, and consequently at right angles to the sand-ridges, leave the butt ends, as it were, of the latter standing out above the flats, in such manner that these extremities and the ridges beyond them offer in the distance the appearance of a line

* "Gibson's desert"—named by Giles, after one of his party who perished in this region.

of broken hills, and were at first mistaken by us for a range. On the margin of these small lakes we got most excellent green feed, the first really good feed for either camels or horses since leaving the Sturt creek. We kept on our south-west course until lat. 26°, where by following some fresh tracks we came on a nice little soakage in the sandy bed of a fair-sized gum creek. This I took to be the Blyth, both from its position, course, and size. Forrest in 1874 marked a tree on this creek, but this I was unable to find—it is possible that it has fallen or been burnt. But a sketch that I made of a remarkable chimney-like peak seen from the head of the creek was at once recognized by Sir John Forrest, so there can be no doubt that we were on the Blyth creek.

Forrest buried numerous articles at his camp on the creek, including a bottle containing letters; I much regret that we were unable to recover such interesting relics. From these cliffs, in which the Blyth and other creeks originate, I saw the sand-ridges which we had just been skirting.

On leaving the creek, we steered for Woodhouse lagoon (a mile or so south-south-east of Mount Worsnop), and that day we had the first rain that we had experienced on either trip. This enabled us to get on without carrying water for the horses, of which we had now lost one—from internal complaints brought on by hardship. The lagoon we found to have but a few inches of water, whereas last August it had as many feet; and, again, last August, Alexander spring was as dry as a bone, and resembled a common rock-hole in the bed of the gully, whereas this time I found it brimful of the most crystal clear water. Small pools of water were lying about all over the rocks, so evidently the rain had been fairly heavy, but not heavy enough to run the creek below Alexander spring, which is the main supply for the lagoon.

A fairly large camp of blacks must have been camped here shortly after our first visit, evidently holding a corroboree, for between the Mount and Alexander spring I found a cleared place in the scrub, stones stuck up in the forks of the enclosing mulga trees, and a sort of altar of bushes, before which numerous tracks had passed to and fro. Hidden in these bushes I found one of these peculiar long, flat mulga boards, similar to those already described.

From the lagoon we steered a course a little south of west, intending to pass Lake Wells on the north and cut the Bonython creek, but on nearing the lake we found our progress barred by an unmarked arm, which runs away in a chain of small lakes, swamps, and samphire flats, broken by sandhills and ridges, in a northerly direction as far as the eye can see. This arm joins Lake Wells about the centre of what is marked as Von Treuer plateau. This tableland does not extend nearly as far east as was originally thought, and from the north side has not at all an imposing appearance. After several unsuccessful attempts at crossing, all ending in the hopeless bogging of horses and camels alike, we made down to Mr. Wells's crossing, which we knew to

be narrow and good, and here we got over with great ease, not having to carry a single pack—a piece of good fortune. The lake here has a hard bottom within a few inches of the surface, consequently the camels could not sink to any appreciable degree. Mr. Wells's tracks (though made as far back as 1893) are still visible at the crossing. We now followed the same route as Mr. Wells to the Bonython, which, though only a flat shallow watercourse, as described by that traveller, has several good pools in it. Now prospectors' tracks became more numerous, four or five parties having apparently been here. Tracks recently made by cattle—probably stragglers from the Gascoigne district—were also to be seen, but we were not lucky enough to come upon the animals. From the Bonython we steered for the Erliston creek, cutting it just below Mr. Wells's marked tree. The country between the two creeks is for the most part flat desert country and mulga thickets, with a coarse undergrowth of grass. Before cutting the Erliston, we passed through the only auriferous country we had met with since leaving the vicinity of Hall's Creek, but, having been some days without provisions, we made all speed towards Lake Darlot township, and at last reached that place, after an absence from the southern goldfields of almost exactly one year. Thence we went on by easy stages to Coolgardie, having travelled upwards of 3000 miles, for nearly half that distance through country hitherto unexplored.

On looking at the large expanse of "Blank" on the map of West Australia before starting last year, I had argued myself into half expecting to find at least a small belt of mixed country similar to that which includes Lake Darlot and the outlying "finds" in the Mount Margaret district—mixed country in the sense that all round and between many of these far-out fields one finds patches of desert, so that one might probably make the complete circuit of the Lake Darlot field, within a radius of, say, 20 miles, and be all the time in sand and spinifex. But now, after the best part of a twelvemonth spent in travelling, it seems to me fairly certain that if any such mixed country exists, we must have dropped across some of it. Once past the longitude (roughly) of 122° 30′, the character of the country, as well as of the rocks, undergoes an entire change; and from there right away up to the old-established diggings of Kimberley, it is the same dreary monotony of sand and sandstone. Coming back we fared no better, and I am forced to the melancholy conclusion that the greater part of the vast West Australian interior, as seen by us, is useless to man or beast; that a direct stock route between the Kimberley district in the north and the Murchison-Coolgardie fields in the south can by no possibility be found; that there can be little or no hopes of the goldfields extending to any appreciable distance in a north-east direction (that they are most unlikely to extend further east I am satisfied, from what I saw of the country traversed by me in 1894); and that all idea

of any auriferous connection between Kimberley and Coolgardie must be banished from our minds, though I consider it most likely that gold will be traced from Lake Way by the Opthalmia range to the Nor'-west goldfields. It is no pleasant task to have to condemn as useless so large a portion of a prosperous colony; yet I must speak of the country as I have seen it, and would remind you that Western Australia contains many hundreds of square miles of valuable land, of which only an insignificant part has as yet been occupied.

Judging from what Sir John Forrest tells me, I should say, also, that gold may be found near Mount Moore, in the vicinity of Lake Augusta, and it may be added that a small patch of auriferous country (in which no more than "colours" have been obtained) is known to exist in the Warburton ranges, already visited by one or two prospectors. Of the various sources of water-supply found by us, only two can be claimed as permanent, viz. Helena spring and Empress spring.

I may mention that ours was one of the few expeditions through the interior which was unaccompanied by Afghan camel-drivers, and that throughout both journeys we had only one sore back amongst the camels, in spite of the heavy loads they carried across country, well calculated to knock both packs and backs to pieces.

In conclusion, I take this opportunity of putting on record my most deep feelings of gratitude to my companions for their untiring, energetic help through all our journeyings. I verily believe that worse country (or better country either, for that matter) has never been travelled through by a more cheerful party, or by one in which the members of it were more fully in accord; and to the unanimity and ready co-operation that prevailed throughout the camp the successful issue of the expedition must in a large degree be ascribed.

Outgoing Journey.

	Latitude.	Longitude.
	° ′	° ′
Clay pans south of Doyle's or Cutmore's well (July 21) ...	28 35	120 57
Native well on small creek (August 1)	27 40	122 54
Small creek (August 6)	27 9	123 59
Empress spring (August 10)	26 47	124 25
Woodhouse lagoon (August 19)	26 10	124 48
Native well, dry (August 25)	25 15	124 48
Warri well (August 29)	24 57	125 9
Family well (September 17)	22 40	125 54
Native well (September 29)	21 49	126 33
Helena spring (October 5)	21 20	126 20
Soak east of Point Massie (October 14)	20 45	126 23
Godfrey's tank (October 19)	20 15	126 25*
Jew's well (October 27)	19 41	127 17
Mount Bannerman (November 1)	19 27	127 11*
Mount Hawick (November 20)	18 53	127 3
Hall's Creek (December 4)	18 16	127 47

Latitude by observation; longitude by account.

* Latitude by account.

RETURN JOURNEY.

	Latitude.	Longitude.
	° ′	° ′
Hall's Creek (December 4 to March 22)	18 16	127 47
Denison Downs homestead (April 1 to April 6)	19 9	128 13
Lagoon on Sturt creek (April 11)	19 45	127 39
Camp on estuary, above Salt sea (April 15)	20 11	127 31
Camp (April 23)	20 32	128 10
Camp (April 28)	21 4	128 33
Camp near mouth of Glen Wilson (May 2), Stransmore ranges	21 25	128 20
Dwarf well (May 7)	22 19	128 16
Native well, 1 mile west of Mount Webb (May 12) ...	22 57	128 20
Native well (May 16)	23 26	128 42
Large rock-hole (May 20)	23 44	128 52
Deep rock-holes (May 29)	24 20	127 20
Tree (?) on Blyth creek (June 17)	26 0	125 22
Woodhouse lagoon (June 17)	26 10	124 48
Camp (June 25)	26 20	123 23
Camp 2 miles south-west of tree marked L. A. W., on Erlistoun creek (July 12)...	27 36	121 46

Before the reading of the paper, the President said: This evening we shall be engaged in listening to the narrative of the very remarkable and, I think, important journey which has been made by Mr. Carnegie from south to north, and again from north to south, over the desert of Western Australia. It is, I think, almost a quarter of a century since I listened to the terrible account which was given to us by Colonel Egerton Warburton, who crossed that desert from east to west; but I look upon it as a still greater feat to have crossed it from south to north, passing over the tracts of previous explorers, and I feel sure that we shall listen to a most interesting and instructive paper. I will now ask Mr. Carnegie to be kind enough to read his paper to us.

After the reading of the paper, the following discussion took place:—

Sir HENRY NORMAN: I must express my great admiration at the energy and perseverance which Mr. Carnegie has displayed. Unfortunately, I have no personal knowledge of Western Australia, but I believe there are several gentlemen here who have a good deal of knowledge of that portion of the continent.

Sir MALCOLM FRASER (Agent-General for West Australia): I am sure you will agree that Mr. Carnegie has made a most interesting statement out of an apparently uninteresting subject. I have been personally acquainted with all those of whom he has spoken, Mr. A. Gregory, Mr. Forrest, Major Warburton, and Mr. Giles, and his statement is a full corroboration of what they have said. But pray do not go away imagining that Western Australia does not possess a great deal that is interesting. It has been rather unfortunate with our explorers that they have passed within a short distance of excellent country. The Messrs. Forrest passed over or by both Coolgardie and Kalgoorlie, and where Burke and Wills perished years ago is now covered with a flourishing settlement. Therefore let me say, that whilst Mr. Carnegie has only spoken of what he saw, let me hope that there may yet be outside and beyond the range of his horizon, as fine a country as any in the world. The goldfields extend from south to north almost continuously. We undoubtedly owe a great debt to Mr. Carnegie for his explanation of the desert part of the country. But, as I have said, I hope and trust that the present limit of our discoveries may

be extended, and that we may find oases in this great wilderness which may serve for settlement in future in some way or other. With regard to the country travelled over by Mr. Carnegie, although we have in former years covered some of it with horses—for we had no camels in those days—we could not get beyond two or three days' march without a water supply. I have listened to Mr. Carnegie with admiration, and I cannot speak too eulogistically of the pluck and enterprise and the magnificent courage of my young friend; we must remember that his life was in his hands all the time. He has told us that at one point of his journey they lost several of their camels; he might have lost the whole of them, and if that had been so, I am afraid that we should not have seen him or any of his companions again. I hope he will accept from me my sincere tribute of admiration for the pluck he has shown throughout.

The PRESIDENT: If no one else wishes to address the meeting, it only remains for me to thank Mr. Carnegie in your name. The conception of his journey was excellent. He had noticed that his predecessors had crossed from east to west, and he resolved to attempt the journey from south to north and back again across the same desert, so as to explore it thoroughly. It is remarkable that all the great explorers who were his predecessors—Colonel Egerton Warburton, Sir John Forrest, and Mr. Giles—received the highest honour that we have it in our power to bestow,—our Royal Gold Medal. I think that in some respects Mr. Carnegie's journey is quite comparable to them. It certainly is so from the purely geographical point of view, and I have looked upon it, especially in reference to his description of those long sand-ridges, as extremely interesting. I should like to ask him the character of the troughs between the ridges—whether it was soft sand or hard desert ground?

Mr. CARNEGIE: As a rule the ridges themselves were hard and compact at the bottom of the slopes, but at the top, where none of this spinifex grew, the ridges were quite loose, and you could see where it had been blown into little hills, and so forth, by the strong winds. There seemed to be a very strong easterly wind blowing every morning for about two months. Between the ridge there would occasionally be a flat a few hundred yards in width, but as a rule it was simply up and down, like the waves of the sea.

The PRESIDENT: An investigation of the origin of this remarkable formation—which is unlike anything connected with sand-dunes that I have ever heard described in any other part of the world—would be, I think, from a geographical point of view, extremely interesting. Mr. Carnegie has shown all the qualities of a good explorer—remarkable pluck and energy, and determination to carry out the plan which he had originally conceived. He is also a practised observer. In offering him the thanks of this meeting, I think we may look forward (I certainly do) to such an explorer as Mr. Carnegie has shown himself to be—and he is still very young—being able in the future to do still more important work, and to his being of still greater service to geographical science.

MR. CARNEGIE'S MAP.—The map is a reduction of the Hon. D. Carnegie's map on the scale of 1 : 100,000. The survey was plotted by dead reckoning, and checked by frequent observations of south circumpolar stars with the theodolite. The distances were obtained from the rate of travel, and the prismatic compass was used for fixing the position of distant hills by intersections.

MRS. BISHOP ON KOREA AND THE KOREANS.*

By GEO. G. CHISHOLM, M.A., B.Sc.

A WORK by Mrs. Bishop is sure to be full of interest, of novelties, of instruction, and food for reflection. The present volumes, the result of four visits to Korea between January, 1894, and March, 1897, and visits to Manchuria and the Coast Province of Siberia made after her first visit to Korea during the Japo-Chinese war, are no exception. The first of the visits was, in some respects, the most interesting and important. It embraced the ascent of both branches of the Han, a visit to the Buddhist monasteries of the Diamond mountains, and the descent from these mountains to the eastern port of Wensan. From the account given in the *Journal*, vol. i. pp. 546–547, it seems evident that the Rev. Mr. Warner ascended both branches of the river, and not merely the northern one, as she states.† Mrs. Bishop, however, adds some important information about the river-bed and its valley. The waters of the upper Han in both branches are, like those of the upper Senegal and its tributaries, ponded back in many places by transverse barriers of rock, so as to form between these barriers a succession of deep, quiet reaches. It is these barriers that cause many of the rapids that hinder navigation of both branches, though in other places the hindrance is due to the occurrence of pebbly shallows. This structure of the river-bed is no doubt due to the same cause as in the Senegal, the succession of hard and soft rocks, together with the alternation of rainy and dry seasons. During the rainy season the river descends with sufficient violence to scoop out the soft material behind each rocky barrier. One may fairly conjecture that the phenomenon is connected with that which Mrs. Bishop mentions (vol. i. p. 117) as the most striking geological feature of the Han valley, cliffs of laminated limestone "continually presenting the appearance of the leaves of a colossal book."

Mrs. Bishop found Korean cultivation much better on the whole than she had been led to anticipate from the accounts of previous travellers; and from the prosperity and improved bearing of the Korean colonists she saw under Russian rule, she augurs well of the prospects of the people in their own land, if better government could be established there.

Mrs. Bishop is inclined to think that Europeans habitually underestimate the population of Korea. Taking seventy houses at random, she obtained an average of eight to a house, an average confirmed by the

* 'Korea and her Neighbours.' By Mrs. Bishop (Isabella L. Bird), with a preface by Sir Walter C. Hillier, K.C.M.G., late H.B.M.'s Consul-General for Korea. 2 vols. London: John Murray. 1898.

† Both in the note referred to in the *Journal*, and in the source from which the particulars are taken (The *Mission Field*, April, 1893), some confusion is caused by the words "Tanyang, about 25 miles north of Yeng-choun, the most southern point reached." Reference to Mrs. Bishop's map shows that "north" is a manifest mistake for south, and the words "the most southern point reached" relate to Tanyang, not Yeng-choun (Mrs. Bishop's Yeng-chhŏn).

estimates of others whom she quotes (vol. i. p. 82). The total population is generally taken by her at 12,000,000, and in one place she puts it down as 12,000,000 to 14,000,000. The following are census returns or estimates of town populations: Seul, "by a careful census taken in February, 1897," intra-mural, 144,636; extra-mural, 75,189; total, 219,825—males predominating to the extent of 11,079; Pyeng-yang (the Phyŏng-yang of Mrs. Bishop and of Mr. Carles in *Proceedings*, 1886, p. 300, the Ping-yang of the newspapers at the time of the war) before the war, 60,000 (Mr. Carles, above 20,000; Mr. Campbell in the *Proceedings*, 1892, p. 157, probably 100,000), at the time of Mrs. Bishop's visit, one year after the battle fought close by, 15,000;* Hwang-ju before the war, 30,000, now 5000–6000; Song-do or Kai-seng, 60,000; Chemulpo, a foreign population in January, 1897, of 4357 (3904 Japanese, 404 Chinese), estimated Korean population, 6756; Fusan, foreign, January, 1897, 5564 (nearly all Japanese), estimated Korean population of city and prefecture of Tung-nai, 33,000; Wensan, foreign (mainly Japanese) in January, 1897, 1357, estimated Korean, 15,000.

With regard to the other contents of the volumes, there is only space to mention that there are chapters on Korean customs, history, government, education, finance, and superstition; on Christian missions; some pages on trade well worth the attention both of British statesmen and British merchants; and four chapters on Manchuria at the time of the outbreak of the Japo-Chinese war, besides appendices.

Mrs. Bishop has evidently taken pains with the spelling of proper names. Her Korean spellings are mainly in agreement with those of Mr. Carles in the paper in the *Proceedings* above cited, though her Whang-ju is hardly an improvement on his Hwang-ju. These I have not been able to follow, as not being in agreement with the present rules of the Society, and I have altered them in accordance with the map or text of Mr. Campbell's paper in the *Proceedings* for 1892. The Russian names are unfortunately rendered in German forms, and Vladivostok appears under the curious hybrid form of Wladivostok.

THE GEOGRAPHICAL WORK OF THE UNITED STATES COAST AND GEODETIC SURVEY.†

By T. C. MENDENHALL, formerly Superintendent of the Coast and Geodetic Survey; and OTTO H. TITTMANN, Assistant in Charge of the Office of the Survey.

WHILE a relatively small part of the energies of the United States Coast and Geodetic Survey has been devoted, since the creation of the Bureau in 1807, to geographical exploration, it is, perhaps, only just to say that in the character and

* "Four-fifths of its houses destroyed, streets and alleys choked with ruins, hill-slopes and vales, once thick with Korean crowded homesteads, covered with gaunt hideous remains" (vol. ii. p. 114).

† Read before Section E (Geography) at the Toronto Meeting of the British Association, August, 1897.

amount of its precision work it is second to no similar organization in the world. From the very start the standard of work has been the highest attainable in the existing condition of the arts and sciences on which such work must depend, and often, not content with that condition, the Survey has made it its business to better it by original investigations of the first class, leading to improvements in the instruments and methods of the highest importance. It thus became the principal, and for many years almost the only, bureau of the government in which exact science was cultivated. In its outward activities it was essentially an organization for the practical application of science to the solution of certain problems and the issue of certain publications which were of the utmost value to commerce.

The duties to be performed by it were to sound the depths of the ocean along the coasts of the United States, to define the shallows which barred the ways of commerce, to delineate with great accuracy the shores and physical condition of the thousand harbours and estuaries with which a benign Providence has blessed our coasts, to investigate the tides and currents of the waters which bear their precious burden of human lives and property to and fro, and to study the mysterious variations and uncertainties of the magnetic needle by which the course of the navigator was largely directed.

To these immediate problems the Survey addressed itself with vigour and foresight under the guiding hands of Hassler and his eminent successors. Hassler, the friend of Jefferson and Gallatin, enjoyed the confidence and support of these eminent statesmen, but he had before him difficulties as great as his field was wide. Inert public opinion as to the utility of the proposed survey had to be vitalized and moulded, men had to be trained to carry out the technical parts of the work, instruments had to be constructed, and correct methods had to be prescribed. How these difficulties presented themselves, and how they were overcome, will form a proper chapter, not only in the history of the great Survey which yet remains to be written, but also a chapter in the history of the progress of science in this country. It may be said that Hassler, in 1844, saw the fruition of his hopes when a general plan of operations prescribed by him was adopted by a scientific commission composed of army and navy officers and civilians. Its adoption marks the official recognition of the necessity for precise and systematic work in the mapping of our domain; its simple and correct outline of the operations to be followed in making a survey of great extent, has permitted the extension of the work in a manner commensurate with the enlargement of our national domain by acquisitions of territory from France, Spain, and Mexico. With the expansion of territory came the extension of the scope of the Survey, and finally, when the advantages of a transcontinental triangulation became apparent, its geodetic function was recognized by law. In accordance with its primary duties, the Survey has developed and charted the depth of the waters along our coasts with extreme minuteness and accuracy, not only in the rivers, bays, and harbours, but off shore as far as the needs of commerce demanded it. Going beyond the immediate requirements of the mariner, it devoted itself to discovering the depths of the sea over large areas, as is shown by the complete survey of the Gulf of Mexico. Its depths were sounded and charted, its salinity tested, and the temperatures of its waters were recorded. Much earlier than these successful surveys of the gulf were the explorations of the Gulf Stream, important not alone in their geographical results, but in developing methods, often by failures, which rendered subsequent success possible. The hydrographical results achieved are shown on between five hundred and six hundred charts, many of them of such exquisite perfection as to form a standard of excellence for all cartographers.

Its researches in physical hydrography include not only the study of the tides and currents, and incidentally the establishment of planes of reference from which the constancy of the relation between the ocean-level and the land is to be inferred, but it has studied for future comparison the movements of sandy shores, as, for instance, those of Cape Cod and of the exposed islands of Nantucket and Martha's Vineyard, to discover the relationship between the outlying shoals and the changes of the shores. Here again precision of work alone is of any avail, for correct conclusions can only be drawn after the lapse of time and after a standard of comparison has been created by an accurate survey. Want of space forbids the enumeration of many special results, but the discovery of the value of the tidal circulation through the East river as a factor in maintaining the depth of the bar at Sandy Hook, and the discovery of the underrun of the Hudson and its bearing on the feasibility of obtaining a water-supply for the towns along that river, may be mentioned as contributions in a special field of geography.

As properly belonging to the subject of the hydrographical surveys, the literature of the several and successive volumes of the 'Coast Pilots,' published by the Survey, must be mentioned. The 'Coast Pilots' of Alaska, compiled by Davidson, and later by Dall, are invaluable historical records of the geography of that coast, and the same may be said of the volumes covering the remainder of the Pacific coast, and those which describe in detail our Atlantic shores. They are not intended to deal in generalities, but they describe with rigid particularity geographical landmarks which are to guide ships by day and by night.

The maps of the Survey are embellished by accurate representation of the topography which borders our shores. For thousands of miles a narrow fringe of topography has been mapped with minute and necessary accuracy. It is based on local and detailed triangulation, which in turn rests on a larger network of triangles, which co-ordinates all the surveys along the coasts.

The introduction of precise methods for the determination of latitudes and longitudes went hand-in-hand with all the other operations of the Survey. Thus the success of Morse in the spring of 1844 was followed in the autumn of the next year by formal instructions given by Bache to Walker to prepare for telegraphic longitude determinations, but it was not until October 10, 1846, that the method was successfully put into practice by the exchange of signals between Philadelphia and Washington, and thereafter the precise determination of longitudes had merely to await the extension of the telegraph system from point to point within our own borders and throughout the world. As soon as the Atlantic cable had been laid in 1866, the Survey successfully undertook to determine our longitude from Greenwich by the telegraphic method. Up to that time the longitude adopted for Cambridge, Massachusetts, in 1851, was used. The adopted value, $4^h\ 44^m\ 29{\cdot}5^s$, had been derived from many years of laborious observations of moon culminations, eclipses, occultations, and chronometer determinations; but this value was increased (in 1869) by $1{\cdot}35^s$, as the result of comparatively brief cable determinations. Similarly, the longitude adopted for San Francisco, in 1855, as the result of 206 moon culminations, was increased in 1869 by $3{\cdot}1^s$—in linear measure, about three-quarters of a mile—by the telegraphic determination. Within the last year, the Survey has completed and adjusted its primary longitude-net, covering the whole United States, and fixing for all time the astronomical longitudes of the points included in it, not only in their relation to each other, but in all probability their final relation to the initial meridian of Greenwich, since in this adjustment three transatlantic determinations by the Coast Survey, and one by the Canadians, have been used. Less need be said of the many latitude determinations, since the methods adopted, though admirable in their precision, involved no such radical

improvement as that which the telegraph brought about in the determination of longitudes. On the other hand, however, the zenith telescope, as developed by the Survey, has, in the hands of its observers, contributed materially to our knowledge of the variation of latitude.

Reference has been made to the geodetic function of the Survey. It has measured an oblique arc, the last triangles in which have but just now been observed, extending from the north-eastern boundary to the Gulf of Mexico. To join this with the primary chain, as yet incomplete, of triangles along the Pacific coast, a great arc has been measured along the 39th parallel of latitude, the completion of which has been but recently announced.

The adjustment of the triangulation along this great arc, and the adoption of a homogeneous system of geographical co-ordinates, will furnish the fundamental data for the co-ordination of all government or state surveys for all time to come, if it be permitted to fallible human wisdom to make such an assertion. Grand in its inception, splendid in its execution, this monumental work may be reckoned as the most important contribution to the geography of our country, on account of its present and prospective value. The measurement of a great meridional arc along the 98th meridian is in contemplation, and our sister Republic of Mexico, which has just established a Geodetic Survey, it is hoped will take a hand in its extension southward, while to our cousins across the northern border a similar opportunity for its prolongation northward may be offered in the course of time.

The Survey has been especially called upon for assistance in defining the boundaries of eleven states, and aid has been extended to fifteen more by the determination of geographical positions within their borders. In the determination of the national boundaries, it has co-operated in retracing the line between Mexico and the United States, has made topographical surveys along the north-eastern boundary, and in the far north it has determined the crossing of the 141st meridian on the Porcupine and Yukon rivers, in regions to which all adventurous eyes are now turned, and in South-East Alaska it has made exploratory surveys as well as precise geographical determinations for the ultimate delineation of the boundary between Alaska and the British possessions.

The enormous extent of the country included in the operations of the Survey, and especially its nearness to the principal north magnetic pole, offered a rare opportunity for the investigation of the problem of terrestrial magnetism. Observations began at an early date, and have been continued up to the present time, at a constantly increasing number of stations. In addition to a regular periodical study of the magnetic elements at a large number of specially selected points, by the most approved methods and the best of instrumental appliances, the Survey has maintained a photographic registering magnetic observatory, which it has moved, from time to time, from one part of the country to another. It has made extensive publication of the data thus obtained, including a series of magnetic charts, which are of the greatest value to navigators at sea and surveyors on the land. Its archives contain a mass of reliable information concerning terrestrial magnetism unequalled in extent and importance.

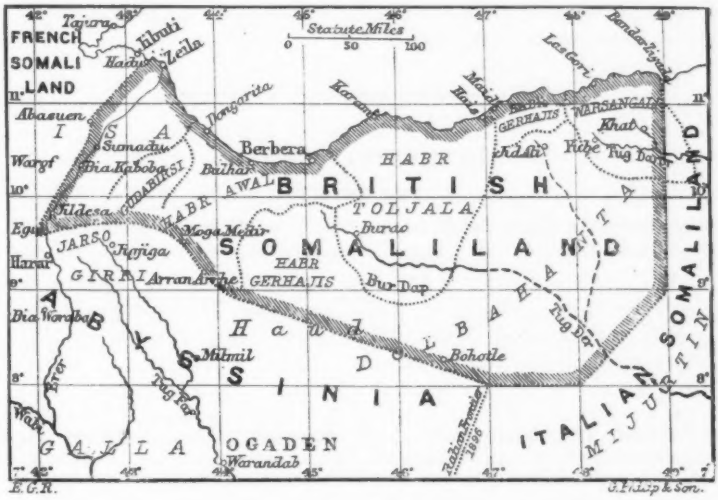
In common with several similar organizations in Europe, it has devoted much attention, mostly during the past twenty-five years, to the study of terrestrial gravity. Beginning with methods long in use, its observers were quick to detect and point out certain serious and hitherto unsuspected faults, necessitating considerable corrections in nearly all accumulated data relating to that subject.

Instruments were also improved and methods greatly changed, increasing at once the precision and rapidity of gravity measurements. Expeditions have been sent to various quarters of the globe for the purpose of gravity observations, and

Coast Survey pendulums have swung in all continents except Australia, in most important cities, on several of the highest mountains, and on many islands in the several oceans. No others have been vibrated so near the pole as these, and none over so wide a range in longitude. The results of these operations, together with the measurement of the great arc of unrivalled length, form a contribution of no ordinary interest to the more precise solution of the great problems of dimensional geography.

THE TREATY WITH ABYSSINIA.

The only boundary referred to in Mr. Rennell Rodd's treaty with the Emperor Menelek is that of British Somaliland, and this has been settled in the spirit of mutual concessions. The agreements made with France on February 1, 1888, and Italy on May 5, 1894,* are not affected by this new settlement. The boundary, as now finally settled, begins at the well of Hadu, between Jibuti, the rising capital of "French Somaliland" and Zeila, follows the caravan route as far as Abasuen and the hill of Sumadu, and then continues in a south-south-west direction up to



the pass above Egu, which lies only 10 miles to the north of Harar, at an elevation of 7500 feet above the sea. Thence it turns abruptly to the east, leaving the northern slope of the mountains with Britain. At Moga Medir ("Moga's eye-tooth"), a heap of rock concerning which Burton tells us a pretty legend, the boundary turns to the south-east, passing through Eylinta Kaddo to Arran Arrhe, near the intersection of the 9th parallel with the 44th meridian. From this point

* See *Geographical Journal*, vol. iv, 1894, p. 56.

a straight line is drawn to the intersection of the 8th parallel and the 47th meridian. The rest of the frontier remains as laid down in the Anglo-Italian Protocol of 1894.* The area thus enclosed and recognized as British Somaliland amounts to 69,000 square miles.

Tribes owning grazing-grounds on both sides of the boundary, as thus defined, are not to be interfered with in their migrations, and are permitted access to the wells nearest to them; but they are to be subject to the jurisdiction of the territorial authority whose frontier they may have crossed.

The caravan route from Zeila to Harar is to be open to the commerce of both "nations."

The treaty provides, moreover, that subjects of and persons under the protection of either party shall be at liberty to come and go freely, and to engage in commerce. "Armed bands," however, are not to be permitted to cross the frontiers without a previous authorization. British subjects are to enjoy every advantage with respect to customs, duties, and local taxation that may have been or shall be granted to other nations. Materials destined exclusively for the service of the Ethiopian State shall be allowed to pass through British territory free of duty. This provision will apply to arms and munitions of war, subject to the rules laid down in the General Act of the Brussels Conference of 1890.

Lastly, Menelik declares the Madhists to be the enemies of his empire, and undertakes to prevent the passage through his dominions of arms and ammunitions intended for them. This important provision was to have taken effect at once, and before the exchange of ratifications.

THE MONTHLY RECORD.

THE SOCIETY.

The Vasco da Gama Celebration.—The Council have decided to hold a special meeting of the Society on Monday, May 16, in commemoration of the fourth centenary of the discovery of the route to India by the great Portuguese navigator, Vasco da Gama. It is expected that H.R.H. the Prince of Wales and His Excellency M. de Soveral, the Portuguese Minister, will be present.

EUROPE.

Twenty-fifth Anniversary of the Founding of the Hamburg Geographical Society.—An intimation has been received from the president and secretary of the Hamburg Geographical Society to the effect that it is proposed to celebrate the twenty-fifth anniversary of the founding of the society in March next. On the 17th of the month a meeting will be held in the hall of the Hamburger Hof at 11 a.m., whilst a dinner in honour of the occasion will take place on the same day at 6 p.m. The Hamburg Society invites the sister-societies and other associations concerned with kindred sciences to take part in the celebration by the sending of delegates. An early reply, with the names of the delegates appointed, is requested.

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* Italy, by the treaty concluded at Addis Abeba on October 26, 1896, is conceded a strip, 180 miles in width, along the Somali coast, as shown in our sketch-map.

The Moraine Amphitheatre of Lake Garda.—In the January number of *Petermanns Mitteilungen*, Dr. Theo. Fischer calls attention to a relief representation of this district that has been drawn up with great technical and artistical skill by the cartographer, Domenico Locchi, under the direction of Lieut.-Colonel Porro, teacher of military geography at the military school of Turin. It has been prepared so as either to be mounted on a stand or fastened to a wall, has a height of rather more than 5½ feet and a width of 5¼ feet, and is on the horizontal scale of 1 : 25,000, and the vertical scale of 1 : 10,000. It appeared at the end of 1896, and its price is 250 lire. Apropos of this production, Dr. Fischer furnishes an account of the district thus illustrated, with references to the original authorities, and points out in some detail how instructive this relief is from a political and a strategical point of view, as well as with regard to the history of the glaciers of recent ice-periods, the nature of ice-action generally, and the local distribution of towns and villages. The communication is illustrated by a sketch-map.

ASIA.

Captain Wellby's and Lieut. Malcolm's Journey across Tibet.—A detailed report on the route across Tibet taken by Captain Wellby and Lieut. Malcolm, accompanied by route-maps on the scale of 16 miles to an inch, has been issued by the Intelligence Branch at Simla. It takes the form of an itinerary, showing the nature of each separate day's march, the names of the halting-places, etc., but containing no general descriptions of the country passed through. By the help of the maps, however, it is possible to trace the precise direction of the route, from the Pangong lake near Leh, to Sining east of Koko Nor. The general direction was at first somewhat to the east of north-east, until near the intersection of the 81st meridian with the 35th parallel. Thenceforward the direction varied little from easterly until the 95th meridian was crossed, the route never reaching the 36th parallel of north latitude during this distance, and but rarely crossing to the south of the 35th parallel. From 95° onwards it diverged more towards the north, until it struck the northern shore of Koko Nor. During 14° of longitude, therefore—from about 81° to 95° E.—the travellers were crossing the least-known part of Northern Tibet, in a direction parallel to the main chain of the Kuen Lun, their route being intersected, during the greater part of this distance, only by those of Littledale and Bonvalot, both running roughly from north to south. The country appears to have been similar to that of Northern Tibet generally, containing no well-marked orographical or hydrographical systems, but consisting of a series of plains or shallow valleys occupied by lakes (salt or fresh), or traversed by nullahs (sometimes dry, sometimes bearing water), and separated by passes of no great elevation above the general level (15,000 to 16,000 feet). Grass seems to have been fairly plentiful, and water could generally be obtained by digging, even when none appeared above the surface. Between 81° and 83° ranges of mountains were seen, both to the north and south—in the latter direction snow-clad. Snow-peaks were also seen subsequently at various points, especially between 88° and 91° and east of 94°, being apparently more numerous on the north. As regards drainage, a northerly direction appears to have predominated between 82½° and 84°, and a southerly one between 85½° and 87½°. An easterly flowing system was met with in about 91½° : it ended in a fresh-water lake a little before 93°, the lake being separated only by a narrow divide from the source of the Chumar, the principal northern tributary of the Di-chu or Upper Yangtse. This was followed down, according to the map, in a due easterly direction almost to 95°. It appears doubtful, however, whether the longitudes are to be trusted at this part of the route, as the junction of the Chumar with the Di-chu, before

which it flows almost southerly, has been placed by other travellers west of 95°. The Chumar was a rapid stream, and soon increased to a considerable size: where split up into several channels, the whole bed was sometimes a mile in width. From the Chumar onwards the route led through country already traversed by Prjevalsky, Rockhill, and others, and the additions to our knowledge are principally in matters of detail.

Explorations in Eastern Asia Minor.—To the November and December numbers of *Petermanns Mitteilungen* (1897), Roman Oberhummer contributes an account of the journey referred to in our note on p. 332 of vol. ix., the account being accompanied by a map (in the November number) on the scale of 1 : 500,000. As stated in that note, one of the main objects of the journey was to explore that portion of the Kizil Irmak that lies between Kessek-kepri (south of Kirshehr, in about 34° 10′ E.) and Kepri-kei (south-east of Angora). No traveller, according to Prof. Kiepert, had visited the part of the valley of that river lying between the bridges at these two villages, but this gap is now filled in. The upper section of this portion of the Kizil Irmak valley was found to have, on the whole, level and well-cultivated banks, such as are met with still higher up; but lower down, in about 33° 33′ E., the river enters a narrow defile, in which its course is interrupted in two places by cataracts. At the end of this defile, Oberhummer and his companions discovered, to their surprise, the ruins of an old bridge, from the ends of which roads still lead landwards on both banks. From the style of construction, it is conjectured that this bridge may belong to Byzantine or later times. After reaching Kepri-kei the party returned southwards to Koch-hissar, to the east of the Tuz-gel, and thence turned eastwards to a ford of the Kizil-Irmak in 35° 49′ E., which had previously been crossed by Prof. Ramsay. Two or three miles south of this ford, in returning to Nevshehr, they passed a mound about 130 feet high, the vicinity of which was strewn with stones, and behind which, at the distance of about 100 yards, they saw three fragments of a wall built with stone and mortar, upwards of 6 feet in height and about 5 feet thick, standing almost in one line at intervals of 16 to about 30 feet. Oberhummer thinks it not impossible that this may have been the site of a considerable settlement (perhaps the ancient Parnassos), if it was not a military station for the protection of the road that crossed the river close by. The following estimates of population, made by Oberhummer for different places on his route, may be mentioned: Homs, nearly 40,000; Hamah, about 60,000; Aleppo probably not less than 150,000, including 25,000 Christians; Nigde, 6000; Kaisarieh, about 60,000, including 15,000 Christians; Kirshehr, 4000. Some of these estimates differ considerably from those of Cuinet. Oberhummer expresses warm gratitude for the protection afforded throughout by the Turkish Government, and the courtesy of the officials with whom he was brought in contact.

The Climates of Eastern Siberia and Northern America.—An instructive study on this subject is contributed to the *Annales de Géographie* (November, 1897, and January, 1898) by the well-known Russian meteorologist, Dr. A. Woeikof. The writer devotes his chief attention to a careful examination of the principal characteristics of the climate of Eastern Siberia, briefly pointing out, in the concluding section of his paper, the chief points of difference to be observed in Northern North America. Eastern Siberia is one of the great *anti-cyclonic* regions of the globe, marked in winter by a consistent high pressure, accompanied by calms and very low temperature. The annual amplitude of temperature is also excessive. Our knowledge of the climate is based at present on observations made in the valleys of the principal rivers, whilst the varied nature of the surface entitles us to look for great differences of temperature between neighbouring localities. An

estimate may be formed of the temperatures of the upper strata of the atmosphere, and of the mountains as opposed to the valleys, by a study of the phenomena observed in Europe at the time of the most marked anti-cyclones. Dr. Woeikof concludes from this comparison, that as a rule the upper strata are at a considerably higher temperature than those adjacent to the surface of the ground, and thinks that this explains the fact that stations near the Arctic ocean have a less rigorous winter than those in the interior of the country. This is certainly not due to the influence of the sea, but rather to the fact that the northern *tundras* are more exposed to the action of the winds, which, by mingling the strata of the atmosphere, raise the temperature of the lower layers. It seems probable also that the mean annual temperature of the mountains is above that of the valleys, the anti-cyclonic conditions of winter (when the compression of descending currents is a source of warmth) predominating over those of the short summer. As regards the annual range of temperature, it is greatest in the interior valleys, the coasts being distinguished by their low summer temperature. Dr. Woeikof devotes a separate section to the climate of Southern Irkutsk and Transbaikalia, which correspond in latitude to the principal centres of population in Europe, and which are now attracting attention as a possible field for emigration. In spite of the low mean temperature of the year, the summer temperature is sufficient to ripen the cereals of Russia and Central Europe, while the clear sky and pure air of winter renders the country eminently adapted as a sanatorium for consumptives, and the abundance of sunlight gives exceptional facilities for cultivation under glass. The climate of the Amur provinces and of the eastern coast region is much less favourable owing to the strong winds of winter and the humidity of the summer months. In Northern America the winter temperatures are not nearly so low as in corresponding latitudes in Eastern Siberia. The reason assigned by Dr. Woeikof is that in the former country there is a greater movement of the air, due both to topographical and to meteorological causes. From a table showing the mean summer and winter temperatures of positions in corresponding latitudes in Eastern Asia and North America, it appears that, whereas in lat. 56° 30′ N. the difference between the winter temperatures is trifling, further south the difference in favour of America amounts to nearly 20° Fahr. This may be explained by the greater frequency of south-west winds on the east coast of America and by the influence of the Gulf of Mexico. As regards summer temperature, America is generally colder than Asia.

Discovery in Celebes.—The January number of *Petermanns Mitteilungen* contains a letter from the Dutch missionary, the Rev. A. C. Kruijt, the rediscoverer of Lake Poso (*Journal*, vol. viii. p. 296), giving an account of a journey in which he, in company with Dr. Adriani, discovered Lake Lindu. Hitherto this lake had been known only through the inquiries of von Muschenbroek and von Rosenberg, and doubts had occasionally been expressed as to its existence, but these doubts are now set at rest. The lake is of about one-fifth of the size of Lake Poso, oval in shape, with low marshy shores, overgrown with aquatic plants, abounding in fish, so that many of them were caught by hand by members of the explorers' party. It lies at the height of about 3000 feet above sea-level, and is drained by the Palos, a map of whose basin has been prepared by the explorers. The results from a linguistic and ethnological point of view are also important, and a collection of stones has been sent to Prof. Wichmann of Utrecht.

Dutch Expedition across Borneo in 1896–97.—An account of this expedition, accompanied by a map of the Mahakam or Kutei basin, on the scale of 1 : 2,000,000, and an enlargement of the upper part of the river on twice that scale, is given in the January number of *Petermanns Mitteilungen* by its leader, Dr. A. W. Nieuwenhuis. Dr. Nieuwenhuis had been a member of the expedition which had

been compelled to turn back in 1894 by the hostility of the natives, and, residing for two months on the banks of the Mendalam to study the Kayan-Dayaks of that district, he had learnt the cause of this hostility. The natives had been alarmed by the somewhat military aspect of the previous expedition. He therefore determined to organize an expedition with as little appearance of this sort as possible, and receiving the sanction of the Netherlandish-Indian Government and the financial support of the Dutch Society, he set out from Batavia at the end of February, 1896, with a party of two Europeans (Demmeni, the sergeant of the topographical department, Batavia, and F. Count v. Berchtold, who was to prepare the zoological specimens), and two Javanese from the botanical gardens of Buitenzorg. Obtaining fifty Kayan boatmen and bearers, the party started from Putus Sibau, on the Kapuas, on July 3. No serious difficulties occurred with the natives. Everywhere medicines and small presents of rings, needles, beads, and tin boxes were found to be the best means of arriving at an understanding. About the end of August the party established themselves at a station among the upper waters of the Mahakam, and there they remained exploring and collecting till April 23, 1897. They then descended the Mahakam in boats to Tepu at the commencement of regular steamer navigation, and thence they and their collections were brought down in two steamers by the Sultan of Kutei and the local official at Samarinda. All the party, except one of the Javanese, who had been attacked by beri-beri (from which he afterwards recovered), arrived at Batavia in the best of health on June 16. The collections also, including thirty-three boxes of living plants from Central Borneo, were little injured.

New Island near Kudat, British North Borneo.—A short note by Mr. R. M. Little, describing a visit to a small island which rose from the sea during the earthquake of last year, appears in the *British North Borneo Herald* for January 1. The island, which is about 100 yards square, is situated about 4 miles south-east of Malundangan island, which lies to the east of the larger island of Banguez. It rises 3 feet above high-water mark, and is covered with large boulders of hard sandstone, coloured, like the whole island, of a greyish white. The substratum is fire-clay traversed by cracks running from north-east to south-west. Coral of various kinds is strewn over the surface, and the boulders are covered with small oysters. Deep water is found to the north-west and west of the island, but to the south-east the sea is shallow. A shoal, partly visible at low water, had existed previously, according to native accounts. The emergence of the island is said to have been accompanied by the appearance of two waves, crossing the sea to the north, and by a rumbling noise, as well as a furious wind.

AFRICA.

The Navigability of the Middle Niger.—The work of Lieut. Hourst has been supplemented, as far as relates to the navigability of the Niger below Timbuktu, by a canoe voyage carried out in May, 1897, by Lieut. de Chevigné (*Comptes Rendus*, Paris Geographical Society, 1897, p. 369). Lieut. Hourst, who descended this part of the river during the season of high water, found it free from obstructions as far as Ansongo. M. de Chevigné, however, experienced great difficulties in getting his canoes over the numerous sandbanks exposed in May, at which season the river falls with great suddenness. At Kcina jagged rocks are said to obstruct the passage completely. The Niger can therefore be considered navigable from Timbuktu to Ansongo only at high water, whilst below that place navigation is always difficult, and all but impossible during nine months of the year.

Recent Surveys in Unyamwezi.—A large-scale map, embodying recent surveys by Pater Capus and Lieut. v. Wulffen in Unyamwezi, is given in Part 4

of the *Mitteilungen aus den Deutschen Schutzgebieten* for 1897. According to a note by Dr. R. Kiepert, the routes of these travellers fill up a previously blank space between the routes of Speke (1858) and Stuhlmann (1890), and supply information respecting a number of new districts in Unyamwezi. The map—which is intended as one of a series which are to bring up to date certain sheets of the map of German East Africa on the scale of 1 : 300,000—also lays down, for the first time with all the details, a section of Count Götzen's route of 1894.

Captain Ramsay's Expedition to Ruanda.—We have already referred to recent explorations by Captain Ramsay, commandant of the German post at Ujiji, near the north end of Lake Tanganyika (*Journal*, vol. ix. p. 326). He has since made another journey through Uha, Urundi, and Ruanda, some details respecting which are given in the *Mitteilungen aus den Deutschen Schutzgebieten* (1897, part 3). Starting from Ujiji with three other Europeans, Captain Ramsay passed by the source of the Malagarazi and proceeded northwards down the valley of the river, crossing it afterwards into the territory of Luassa, the most powerful sultan of Uha. His country is extremely fertile and well peopled. Crossing the Malagarazi again, the expedition entered Urundi, and proceeded across a mountainous but well-peopled district to the Ruvuvu, considered by Dr. Baumann to be the head-stream of the Kagera. This view is not held by Captain Ramsay, who visited the confluence of the Ruvuvu and Akanyaru, and considers the latter to be far the more important. It is often known as the Kagera, whilst the Ruvuvu never is. At the junction Captain Ramsay crossed into Kisakka, a part of Ruanda, following up the course of the Akenyaru and discovering several small lakes connected with it. The junction of the Nyavarongo and Akanyaru was found to be a short day's march south of Count Götzen's route. It was difficult to decide which was the larger stream, but the Akanyaru seemed to have somewhat the more water. Having visited Kiseke, the capital of Ruanda, and made a treaty with the sultan, Captain Ramsay traversed the most beautiful and thickly peopled part of that country, and reached the Akanyaru near the spot where it was crossed for the second time by Baumann. His attempts to discover the sources of this river and of the Nyavarongo in the Nyakisu mountains proved unavailing, but he was able to convince himself that both rivers rise in the high range shown on the maps at the edge of the Ruanda plateau. Again entering Urundi on the return route, the travellers were, for the second time on their journey, hailed as "mami" kings, receiving an ovation similar to that accorded to Dr. Baumann. Captain Ramsay differs from the latter with regard to King Mwezi, and the Mwezi or Moon mountains. The name, he says, belongs to the present king, from whom the mountains take their name, since he happens to live near them. Ruanda is described as an immense plateau, without trees or brushwood; densely populated and very fertile. Its rulers are Watussi. They, as well as the Wanya-Ruanda, are well clothed with stuff brought by traders from Karagwe, while the people of Urundi wear only bark-cloth. The latter country is said to be the finest in German East Africa.

M. Foa's Route across Africa.—M. Foa arrived in Paris about the middle of January, and soon afterwards gave, at a meeting of persons interested in Africa, some details as to his recent journey across that continent (*Politique Coloniale*, January 23; *Mouvement Géographique*, No. 5). Arrived at the south end of Lake Tanganyika, M. Foa made the complete circuit of the lake by water, and from Ujiji, then in ruins, crossed over to the west side, reaching the Congo north of Nyangwe by a new route. On the way he fell in with the revolted troops of Baron Dhanis, and further progress was a matter of difficulty. He finally descended the Congo by canoe, the voyage taking five and a half months. He has taken over 800 astronomical observations, and brought back extensive zoological

collections. He speaks highly of the work of the Belgians on the Congo, but reports that the results obtained in French Congo are almost *nil*.

Frontiers of German East Africa.—In the definition of the boundary between German East Africa and Nyasaland by the treaty of 1890, it was supposed that the point where the Songwe river makes a sudden bend to the north lay to the west of the 33rd meridian of east longitude, to which line, from its mouth in Lake Nyasa, the course of the river was to form the boundary. It has lately been proved by astronomical observations (*Globus*, 1898, p. 84) that the point mentioned lies 6′ east of 33° E., so that an ambiguity arises as to the interpretation of the agreement. A preliminary arrangement was arrived at in October last between Mr. Alfred Sharpe and Herr von Elpons, whereby the boundary would follow the Legange or Katendo, a tributary of the Songwe, as far as a place named Vimba, whence it would strike across to the Congo watershed. This will require, however, to be ratified by a duly accredited commission. Rumours have lately circulated with regard to difficulties between Germany and the Congo state as to their mutual frontier north of Lake Tanganyika. It is stated, however, in the *Mouvement Géographique*, that no question had arisen, officially, between the two powers—the boundary of the state being clearly defined by various international agreements, an enumeration of which, eleven in all, is given by the Belgian paper.

AMERICA.

Fogs on the Newfoundland Banks.—A recent number of the *Annalen der Hydrographie* contains a paper by Dr. Gerhard Schott on the average distribution of fogs on the Newfoundland banks, accompanied by twelve maps, showing the regions of greatest frequency for each month. The discussion is based upon all the data collected by the *Deutsche Seewarte* during the last twenty-one years, and is a contribution to our knowledge of the subject of marked scientific and practical importance. Dr. Schott finds that the period of greatest frequency of fogs begins in April and lasts till August; there is a sudden diminution in September, and the smallest number of fogs is recorded in February. Two regions are most frequently visited—one near the east coast of America, south of Nova Scotia, and another on the eastern margin of the Great Bank. Applying the conclusions arrived at to the needs of the mariner following the recognized steamer routes, it appears that in general he may expect: From 70° to 65° W., much fog; from 65° to 52° W., little fog; from 52° to 47° W., very much fog; from 47° to 40° W., little or no fog. The monthly charts, of course, give further information as to the probable extent of a foggy area, and the quickest way out of it. The routes adopted by the great steamship lines in 1891, and modified last year, have been laid down with an almost exclusive regard to the danger from drift-ice. Dr. Schott combines the risks of ice and fog, and recommends as follows: (1) From middle of January to end of March, the 49th meridian should be crossed in 42° N. lat. by westward-bound ships, in 41° 10′ N. by eastward-bound ships (danger of ice). (2) From beginning of April to end of August, the 49th meridian should be crossed in 41° N. lat. by westward-bound ships, in 40° 10′ N. by eastward-bound ships (danger of fog and ice). (3) From beginning of September to middle of January, the 49th meridian should be cut in 46° N. lat. and in 45° 10′ N. lat. by westward and eastward bound ships respectively. In the first case a somewhat more northerly course than usual is allowed; in the second it is recommended to continue the southerly route for six weeks longer than usual.

Transcontinental Arc Measurement.—On March 3, 1871, the United States Congress made an appropriation "for extending the triangulation of the

coast survey, so as to form a geodetic connection between the Atlantic and Pacific coasts of the United States." Mr. E. D. Preston, in a paper before the Philosophical Society of Washington (*Bulletin*, vol. xiii. pp. 204–222, map), deals with the magnitude and importance of the work. The transcontinental arc is practically completed, and is stated to be the largest arc of longitude ever measured by any single government. It extends from Cape May lighthouse, in New Jersey, to Point Arena light, in California, the distance being 2625·6 miles. These points are within a very few miles on the same parallel of latitude. In this great network there are 266 primary stations. The arc consists exclusively of quadrilaterals, or figures equally as strong. Four stations are above 14,000 feet elevation, and twenty are beyond 10,000 feet. On the transcontinental arc nine bases have been measured. The longest line observed was from Uncompahgre, with an elevation of 14,300 feet, to Mount Ellen, 11,300 feet high, giving the unprecedented single sight through a distance of 183 miles. There are more than twenty lines over 100 miles in length, each of which has been observed from both directions. In pointing out the value of the transcontinental arc, the author says, "Not only is it national in its use, but every state through which it passes comes into possession of accurate geographical positions; and not alone that, but every state lying near the thirty-ninth parallel can, at slight expense, fix its own boundaries with an accuracy not inferior to that given by the best government surveys in the world. No less than sixteen states are directly benefited by the triangulation across the continent, and as many more have the possibility of benefit."

Proposed Meteorological Station on Mount Satulah, North Carolina.—A note in the *Monthly Weather Review* for October, 1897, refers to a suggestion by Mr. B. C. Hawkins, that an observing station might with advantage be established on Mount Satulah, 4490 feet, one of the highest summits at the south end of the Blue Ridge, in the southern Appalachians. In the same number of the *Review*, Mr. Hawkins calls attention to the area of heavy rainfall which exists in the southern Blue Ridge mountains, the annual total being 68 miles or more throughout the area, which includes parts of Georgia and of North and South Carolina. It is, however, pointed out by the editor, that although a continuous record at the summit of Satulah mountain would help to elucidate some interesting problems, previous attempts to maintain self-registering apparatus at such stations have met with little success.

The "Moodus Noises" in the Connecticut Valley.—Prof. W. M. Davis has a short note in *Science* for December 3 on the so-called "Moodus noises," which, after a cessation of twelve years, have lately been heard again in the lower Connecticut valley. These noises, which seem to indicate local disturbances in the geological formations of the district, had been heard by the Indians before the coming of white men, and were particularly frequent in the early part of last century. During the present century they had previously been heard twice, in 1852 and 1885. The sounds recently heard are likened to muffled thunder, and to the roar of a distant cataract or of the wind in a tempest. Houses, etc., trembled as in an earthquake. Prof. Davis remarks that these sounds deserve special study in view of the compressed condition of the rocks in the Monson quarries.

POLAR REGIONS.

Proposed Polar Expeditions.—*Science* for January 28 contains the report by Prof. Heilprin, as chairman of the Committee on Antarctic Exploration, appointed at the Philadelphia meeting of the American Society of Naturalists, 1895. The report shows that great difficulties have been met with in arriving at

any feasible scheme for an Antarctic expedition. Suggestions have been made as to the feasibility of one or more joint commercial (whaling) and scientific enterprises; but, in view of the large capital outlay required, the Committee doubt the desirability of such an undertaking. It is considered preferable that any expedition sent out should be purely scientific in character; and the belief is expressed that the required funds would be forthcoming if an appeal were made for the co-operation of a selected number of scientific associations and institutions of general learning. According to a correspondent of the *Times*, a Canadian North Pole expedition is also under consideration, its projector being Captain Bernier, who has had much experience of sealing and other voyages. He proposes to start in June next, and to proceed by Bering Strait to the spot where the *Jeannette* was wrecked, and thence make for the pole with dog and reindeer sledges. (It does not appear whence fodder for the latter is to be obtained during a journey over the frozen ocean.) The Quebec Geographical Society is reported to have expressed its approval of the scheme, and to have voted an application to the Federal government for a subsidy. It is also announced that the Duke of the Abbruzzi, the leader of the expedition which successfully ascended Mount St. Elias last summer, will start during the present year on a three years' voyage of arctic exploration. He intends to spend the first winter in Franz Josef Land, and will endeavour to make his way thence towards the pole.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

A Speculation in Topographical Climatology.—We have received a reprint of a paper by Prof. W. M. Davis, published under the above title in the final number of the *American Meteorological Journal*, now defunct. Attention is drawn to certain phases in the general progress of the denudation of land-areas, which deserve the notice of meteorologists because the explanation of various existing topographic features, now in process of formation, requires a recognition of their close dependence on existing climatic conditions, and because the interpretation of other features, of more ancient origin, leads to an understanding of the climatic conditions under which they were produced. A closer study of these phases would lead to the establishment of more definite relations between climate and topography, which would not only make the interpretation of existing conditions within any given area much easier, but would enable us to write climatological history from topographical records. A more forcible illustration of Prof. Davis' thesis could hardly be found than has been afforded by Prof. Penck's recent studies in the north-west highlands of Scotland, noticed in our February number. The first difficulty which has to be met is, of course, the absence of adequate geographical and meteorological training in the case of most travellers; only an observer of special knowledge and experience can identify the characteristic features of topography associated with, say, arid, humid, or glacial conditions. Prof. Davis sketches very briefly a few main points to be looked for under each of these typical conditions, and directs the student to good models of this class of work. The general importance of observations of the species in question is brought out by some very interesting speculation as to the topographical changes to be expected from such a shifting of the great climatic belts as might result from a displacement of the poles. We know that such a displacement is as much a "mathematical impossibility" as the oscillations of the earth's axis recently discovered by Chandler, but the possibility of its having occurred is worth investigating, and at present the necessary information is almost wholly wanting.

German Deep-Sea Expedition.—We learn from the *Geographische Zeitschrift* (February, 1898) that a sum of 300,000 marks has been voted by the budget

committee of the Reichstag in order to carry out the project of a German deep-sea expedition, brought forward by Prof. Chun at a recent scientific congress at Brunswick. The expedition is to start in August, and, after investigating the deep-sea organisms between Scotland and the Shetland islands, will proceed to the West African coast, there to carry out researches on various points connected with marine life and ocean currents. The programme also includes an investigation of the antarctic current, and of the line of meeting of the same with the warm currents from the Indian ocean, and it is proposed to continue the voyage through the Indian ocean, Red sea, and Mediterranean.

Magnetic Surveys of Austria-Hungary.—The first magnetic survey of Austria-Hungary was made between the years 1843 and 1858, the results being reduced to the year 1850. On the initiative of Prof. Dr. Julius Hann, a fresh survey was begun in 1888 under the direction of Prof. Liznar, attached to the *Meteorologische Central-Anstalt*, who brought the work to a successful conclusion in 1894. Observations of declination, dip, and intensity have been made with all modern refinements at 210 stations, including 38 in Hungary, 28 in Bosnia, and 42 on the coasts of the Adriatic; and the results have been reduced by the most approved methods to date midnight January 1, 1890. Investigations into the periodic and secular changes of the magnetic elements are now being carried out with the help of the older data, but it seems that the discussion of the magnetic "disturbances" is likely to yield the most striking results. The great centres of disturbance are Eastern Galicia, the coasts of Adria, and Transylvania. The disturbances are greatest in Eastern Galicia, very slight in Tirol, while Adria shows the remarkable feature that the disturbances are positive in direction on the coast of the mainland, and negative on the islands. There are indications that in Transylvania the disturbing forces tend towards a central point.

Deep Currents of the Bay of Biscay.—In the *Comptes Rendus* of the Paris Academy of Sciences (1898, No. 3) Prof. Thoulet gives the results of his analyses of the deep-water deposits obtained by him during the cruise of the *Caudan* in the Bay of Biscay in 1895. On the hypothesis that the terrigenous material is to a large extent sorted according to density and size of particles before it is deposited, he finds in the distribution of particles of magnetite and other heavy minerals, and of fine clay, evidence for the probable existence of a deep current. The submarine current appears to flow from west to east along the north coast of Spain, and to be deflected along the coast of France, afterwards turning towards the north-west or west-north-west. Its direction is thus opposed to that of the well-established surface current.

GENERAL.

Geography as a Natural Science.—In *Die Natur* for February 13, Prof. Willi Ule, the new editor of that paper, devotes a leading article to the consideration of the claims of geography to rank as a natural science. Surprise had been expressed that he had not ceased to call himself a geographer when he had assumed the editorship of a scientific paper, and thus presumably professed to be a scientific man. Prof. Ule shows how such views result naturally enough from the old style of school-books, in which the impression is conveyed that geography deals only with names. He points out the essential distinction between Topography and Geography, and by several quotations from leading German geographers, confutes the view held by certain educationists, that geography is topography and nothing more. In protesting against taking a simple translation of the word "geography" as a definition of the thing that word signifies, the editor of *Die Natur* says, "What is Geography? It is the science of the phenomena of the Earth. This is more than

a translation of the word 'geography.' The phenomena must be conceived of scientifically, and their cause and effects established; the phenomena are mutually related, and unite together to form a single whole; . . . the object of geography is to explain this whole. . . . The above definition may thus be given a wider and at the same time more precise expression:—Geography is the science of the phenomena of the Earth in their causal interrelations." Prof. Ule points out that it is only within the last few decades, and largely as the result of the continuation of the work of Humboldt and Ritter by Peschel, Richthofen, and Kirchhoff, that this scientific conception of geography has been recognized. The relations of this scientific geography to other sciences can best be understood by the classification of the subject-matter. Besides the necessary distinction between general geography, the object of which is the Earth as a whole, and special geography, which deals with one or other of its various parts, Prof. Ule emphasises the importance of subdividing both special and general geography into three groups: (1) Mathematical geography, which draws largely on astronomy; (2) Physical geography, which enters into close relationships with geology, chemistry, and physics; and (3) Biological geography, which receives aid from botany and zoology, anthropology and history. He concludes this vindication of the position of geography with the words, "I am a geographer, and therefore a man of science."

The Seventh International Geographical Congress.—It is announced in the February number of the *Geographische Zeitschrift*, that some preliminary decisions with regard to the next International Geographical Congress were arrived at at a meeting held in December, under the presidency of Baron v. Richthofen. The first week in August, 1899, has been chosen as the date of the meeting. It will be requested that no special delegates be appointed by the countries which take part in it, owing to certain difficulties to which the system of delegates gives rise. Among the new subjects proposed for discussion, the following are mentioned: The study of drift-ice, the utilization of regions with deficient rainfall, the nomenclature of the oceans, the use of the metre for ocean depths, etc. German, English, French, and Italian are the languages permissible at the meetings.

Geography at the Sixty-ninth Assembly of German Naturalists and Physicians at Brunswick, 1897.—A report on this subject appears in the January number of *Petermanns Mitteilungen*. Among the papers more or less connected with geography read at this meeting were one by Dr. Schreiber of Mainz, on the Points of Contact between Anthropology and Philology; one by Prof. Schmidt of Leipzig, on the Todas of the Nilgiri Hills; one by Neumayer on the History of Pendulum Observations, and another by the same author on South Polar Exploration; one by Dr. Wilser of Heidelberg, on Human Races and the History of the World (chiefly taken up with a theory of the origin and dispersion of the Aryan race, whose earliest seat the author places in Scania); one by Theod. Scheimpflug, lieutenant in the Imperial Navy, on the Application of the Magic Lantern in the Construction of Maps and Plans; one by P. Kahle, assistant in the Technical High School of Brunswick, on the Apparatus and Methods of Topographical Surveying in High Mountains; one by Dr. Chun of Breslau, on Deep-Sea Exploration; one by Prof. Selenga of Munich, on Photography in Journeys of Exploration (India, Ceylon, and Japan); and one by Dr. Hermann Meyer, on Journeys amongst the Headwaters of the Xingu.

Presentation to Dr. Julius Hann.—A special meeting of the Austrian Meteorological Society was held at the University of Vienna on February 12, on the occasion of presenting to the Hofrath Julius Hann the medal struck in his honour by the Society. Prof. J. M. Pernter delivered a lecture on the development of meteorology in Austria.

Death of Lieut. Brasseur.—The death of this enterprising traveller, to whose explorations in the south-east portion of the Congo Free State frequent allusion has been made in our pages, is announced by the *Mouvement Géographique* (1898, No. 7). Lieut. Brasseur was killed while leading an attack on the *boma* of Chiwala, an Arab chief much given to brigandage, who had established himself on the banks of the Luapula in about 12° S. lat. With a short interval he had been on active service under the Congo State since 1890.

Life of Sir Stamford Raffles.*—The interest attaching to the career of Sir Stamford Raffles is largely of a geographical kind; and the copious biography which Mr. Boulger has prepared will be welcome to all students of the Malay Archipelago. Sir Stamford Raffles was born on board ship in the West Indies in 1781, he administered Java for the East India Company during the brief period while it was held as a British possession, strongly opposed its return to the Dutch, founded Singapore in 1819, and died in 1826. The foundation of Singapore was a piece of geographical prescience of the highest order, as the whole eighty years of its existence have proved. It is definitely established in this biography that Sir Stamford Raffles, attracted to the site of Singapore from its historical associations, fully recognized its true value. His official statement says, "I have now the satisfaction to report . . . that a British station commanding the southern entrance of the Straits of Malacca, and combining extraordinary local advantages with a peculiarly admirable geographical position, has been established at Singapore, the ancient capital of the King of Johore."

Two Journeys in Northern Somaliland.—The photographs in Mr. Aylmer's paper (*Geog. Journal* for January) are by Mr. Frederick Gillett, except the first, which is by Mr. F. Gunnis.

Major Grant's Occultation Method.—In the note by Mr. E. A. Reeves, in the February number of this *Journal*, "To find the Angles from the Vertex of the Moon," etc., the paragraph (p. 167) commencing, "The last four lines" to the end of the note, should be read *after the footnote*, to which it belongs.

The Indian Survey Report.—General Strahan, the Surveyor General, writes with reference to a statement in the article in the January number of the *Journal* on the Indian Survey Report for 1895–96, that no change has been made in the Survey year, which has always been from October 1 to September 30, and that the delay in issuing the last report was due to causes beyond the control of the Survey Department.

CORRESPONDENCE.

Maskat.

London, February 14, 1898.

MAY I be permitted to reply to the remarks of Senhor Cordeiro on my Maskat paper, printed in the February number of the *Journal*.

The correction of the inscription had already been made, practically as proposed by Senhor Cordeiro, in my letter printed underneath that gentleman's, and I think the copy of the inscription has proved to be as accurate as could be expected after three hundred years' weathering.

With regard to the date of Dom Henry's death, I should perhaps have written 1579–80, as the year 1579 then was not completed until March, 1580.

* 'The Life of Sir Stamford Raffles.' By Demetrius Charles Boulger. With portraits, maps, and illustrations. London: Horace Marshall & Son, 1897.

The Portuguese were finally driven out of Oman (the province on the Arabian coast) in 1560, as stated in my paper—Maskat being the last place held by them in that country. Their establishment at Kong was on the Persian coast, opposite to Oman. I hope to write about the settlement at Kong in a future paper.

I should be glad to learn whether the names of kings of Portugal or Spain are usually only given as initials in such inscriptions.

I feel much indebted to Senhor Cordeiro for his careful criticism, and quite sympathize with his patriotic feeling about the unjust invasion and seizure of Portugal by Philip II. of Spain, which undoubtedly was one of the chief causes of the ruin of the great Portuguese empire in the East.

ARTHUR W. STIFFE.

MEETINGS OF THE ROYAL GEOGRAPHICAL SOCIETY, SESSION 1897-98.

Sixth Ordinary Meeting, January 31, 1898.—Sir CLEMENTS MARKHAM, K.C.B., President, in the Chair.

ELECTIONS.—*Rushton Webber Adamson; George William Bird; Peter McNeil Carney; George Richard Clarke; Rev. Henry Dalzell, M.A.; Arthur Matthew Weld Downing, M.A., D.Sc.; Robert Fenner; Hon. Wm. Chas. Hanbury-Tracy; Richard Henry Harris; Lieut.-Colonel G. H. Henderson; Frederick G. Henriques; Robert Louis Jefferson; Henry Knight; Hy. A. Hallam Furnaby Lennard; Arthur Edward Lightbody; Allan McGregor; Duncan Mackinnon; Captain John Marriott (Norfolk Regiment); Richard Caldwell Minton; Major Henry Courtenay Morland (Retired, 9th Lancers); Alfred Edward Moxon; Admiral Gerard Henry U. Noel; L. C. F. Oppenheim; Rev. Hy. Wm. Leycester O'Rorke, M.A.; Gilbert Parker; Legh Sylvester Powell; Ambrose Beatty Rathbone; T. Sankey; Fred. Sykes; Arthur Boddam Taylor; Charles Erskine Vertue; Stuart Monteith Vines, B.A.; Sir Charles George Walpole, C.B.; William Gibson Wedderspoon; Brigars Robert Williams; John Clark Wilson; Oswald Vavaseur Yates.*

The Paper read was:—

"Through Somaliland to Lake Rudolf." By H. S. H. Cavendish.

Seventh Ordinary Meeting, February 14, 1898.—Sir CLEMENTS MARKHAM, K.C.B., President, in the Chair.

ELECTIONS.—*Edward Dodson; Captain J. Markham (60th Rifles); Richard Smith; William Myers Wills; Basil Aubrey Holland Wood.*

The PRESIDENT said: Before we commence the proceedings of the evening, I should like to mention that some progress has been made with regard to private antarctic work. Mr. Borchgrevink has purchased a very strongly-built whaler in Norway, well fitted for ice-work, and he is now, I believe, busily engaged in preparing his expedition, which will sail next July. I am sure that we wish him all possible success. I trust also that M. de Gerlache, in spite of very limited resources, will soon be able to send us home a report of useful results.

The paper read was:—

"A Recent Journey in Western Australia." By the Hon. David W. Carnegie.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By HUGH ROBERT MILL, D.Sc., *Librarian*, R.G.S.

The following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Com. = Commerce, Commercial.
C. Rd. = Comptes Rendus.
Erdk. = Erdkunde.
G. = Geography, Geographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
Iz. = Izvestiya.
J. = Journal.
M. = Mitteilungen.
Mag. = Magazine.
P. = Proceedings.
R. = Royal.
Rev. = Review, Revue, Revista.
S. = Society, Société, Selskab.
Sitzb. = Sitzungsbericht.
T. = Transactions.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.
Zap. = Zapiski.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6¼.

EUROPE.

Alps. *Mem. S.G. Italiana* **7** (1897): 63–80. **Marson.**

Sui ghiacciai del massiccio del Monte Disgrazia, osservazioni del 1896. Nota del socio prof. Luigi Marson. *With Illustrations.*

Alps *Z. Deutschen u. Österreich. Alpenv.* **28** (1897): 88–113. **Zwiedineck-Südenhorst.**

Die Ostalpen in den Franzosenkriegen. Von Hans v. Zwiedineck-Südenhorst.

On the Eastern Alps during the French invasions of 1796–97, 1799, 1800–1801.

Alps—Eastern. *Z. Deutschen u. Österreich. Alpenv.* **28** (1897): 154–357. **Various Authors.**

Aus dem Alpenkranze des Defereggenthales, von L. Purtscheller (154–187). Die Reichenspitzgruppe, von Dr. Fritz Koegel (188–220). Die Alpen des Grosinathales, von M. v. Prielmayer (229–263). Der Wilde Kaiser, von Joseph Enzensperger (264–292). Die Rosengartengruppe, von L. Norman Neruder (293–333). Eine Wanderung durch die Bergamasker Alpen, von H. Steinitzer (334–357).

Alps—Place-Names. *Z. Deutschen u. Österreich. Alpenv.* **28** (1897): 72–87. **Redlich.**

Ueber Ortsnamen der östlichen Alpenländer und ihre Bedeutung. Von Oswald Redlich.

On the meanings of place-names in the Eastern Alps, and their origin.

Austria. **Finsterwalder.**

Wissenschaftliche Ergänzungshefte zur Zeitschrift des D. u. Ö. Alpenvereins. I. Band.—I. Heft. Der Vernagtferner, seine Geschichte und seine Vermessung in den Jahren 1888 und 1889. Von Dr. S. Finsterwalder. Dazu ein Anhang: Die Nachmessungen am Vernagtferner in den Jahren 1891, 1893, und 1895. Von Dr. A. Blümcke und Dr. H. Hess. Graz: Verlag des Deutschen und Oesterreichischen Alpenvereins, 1897. Size 11½ × 8, pp. 112. *Maps and Plates.*

This will receive special notice.

Austria—Alpine Lakes. **Richter.**

Seestudien. Erläuterungen zur zweiten Lieferung des Atlas der österreichischen Alpenseen. Von Dr. Eduard Richter.—Geographische Abhandlungen. Herausgegeben von Prof. Dr. Albrecht Penck. Band vi., Heft 2. Wien: E. Hölzel, 1897. Size 11 × 7½, pp. 72. *Diagrams. Presented by Prof. Dr. A. Penck.*

Austria—Karst. *Riv. G. Italiana* **4** (1897): 385–391. **Marinelli.**

Fenomeni carsici, grotte e sorgenti nelle prealpi Giulie Occidentali. Del Prof. O. Marinelli.

Austria—Sonnblick. *Z. Deutschen u. Österreich. Alpenv.* **28** (1897): 52–71. **Penck.**

Gletscherstudien im Sonnblickgebiete. Von Albrecht Penck. *With Illustrations.*

Austria—Tauern. *Z. Deutschen u. Österreich. Alpenv.* **28** (1897): 114-134. **Grasberger.**
Aus dem alten Tauriskerlande. Von Hans Grasberger.

Austria—Tyrol. *Z. Deutschen u. Österreich. Alpenv.* **28** (1897): 34-51. **Löwl.**
Kals. Von Ferdinand Löwl.
On the physical geography and geology of the Kals valley.

Baltic. **Cleve, Ekman, Hjort, Pettersson.**
Skagerracks Tillstånd under den nuvarande Sillfiskeperioden. Af P. T. Cleve, G. Ekman, J. Hjort, O. Pettersson. Göteborg: D. F. Bonnier, 1897. Size 12 × 9½, pp. 40. *Map and Plates.*
On the physical and biological conditions of the Skagerrak in 1893.

Belgium. *Mém. Couronnés A.R. Belgique* **54** (1896): 1-56. **Fraipont and Tihon.**
Explorations scientifiques des cavernes de la vallée de la Mehaigne. Par Julien Fraipont et F. Tihon. *With Plates.*
The caves are studied in their geographical, geological, and anthropological aspects.

Belgium and France. *Mém. Couronnés A.R. Belgique* **48** (1895): 1-588. **Kurth.**
La frontière linguistique en Belgique et dans le nord de la France. Par Godefroid Kurth.
This memoir gained the Stassart Prize of the Royal Belgian Academy for a memoir prescribed as follows: "To trace on the map of Belgium and the neighbouring departments of France, a line of demarcation separating the regions of romance and germanic languages as at present existing. To consult ancient documents containing lists of place-names, and to obtain evidence whether the present line has remained the same during past centuries, or if, for example, particular Walloon communes have become Flemish, or *vice versâ*. To prepare historical maps showing the fluctuations for periods, the extent of which it is left for the competitors to decide. Finally, to discuss the causes of the changes or the permanence which has been demonstrated." Unfortunately, the memoir is not illustrated by maps.

Switzerland—Cartography. *Mém. S.G. Genève* **36** (1897): 1-21. **Lochmann.**
La cartographie moderne de la Suisse. Par M. le Colonel J.-J. Lochmann.
An account of the chief Swiss maps published since 1830.

Switzerland—Lake of Geneva. *Z. Ges. Erdk. Berlin* **32** (1897): 219-243. **Halbfass.**
Morphometrie des Genfer Sees. Von Dr. Wilhelm Halbfass. *With Diagrams.*
This will receive special notice.

Switzerland—Mont Salève. *B.S.G. Genève* **36** (1897): 127-148. **Pitard.**
Notes sur la faune des vertébrés du mont Salève. Par M. Eugène Pitard.

Switzerland—People. ———
Statistique de la Suisse. 111e livraison. Examen pédagogique des recrues en automne 1896. Publié par le Bureau de statistique du Département fédéral de l'intérieur. Berne, 1897. Size 11 × 9, pp. 14 and 20. *Map.*

Switzerland—Ticino. *Deutsche Rundschau G.* **20** (1897): 97-103. **Halbfass.**
Bosco, das einzige deutsche Dorf im Tessin. Von Dr. W. Halbfass.

Turkey—Adrianople. **Gaetani.**
Bollettino del Ministero degli Affari Esteri. November, 1897. Turchia. Il Vilayet di Adrianopoli. Rapporto del cav. O. Gaetani d'Aragona di Castelmola. Roma: Libreria Bocca. Size 9 × 6½, pp. 16.

Turkey—Albania. *B.S.G. Italiana* **11** (1898): 23-27. **Baldacci.**
Vromonero e le sue acque solfuree. Comunicazione del socio dott. A. Baldacci.
On the sulphurous wells of Vromenero at the confluence of the rivers Sarantaporos and Vojussi.

Turkey—Albania. *Verh. Ges. Erdk. Berlin* **24** (1897): 529-544. **Hassert.**
Herr Dr. Kurt Hassert: Streifzüge in Ober-Albanien. *With Map.*
This will be specially noted.

Turkey—Bosphorus. *G.Z.* **4** (1898): 16-26. **Philippson.**
Bosporus und Hellespont. Von Privatdocent Dr. A. Philippson. *With Map and Plates.*
On the physical geography of the region on both sides of the Bosphorus.

United Kingdom—Coal Supply. *J.R. Statistical S.* **60** (1897): 789–810. **Courtney.**

"Jevons's Coal Question: Thirty Years after." The Inaugural Address of the Right Hon. Leonard H. Courtney, M.A., M.P., President of the Royal Statistical Society. Session 1897–98. *With Diagram.*

United Kingdom—England. *Nineteenth Century* **43** (1898): 47–60. **Jessopp.**

Parish Life in England before the Great Pillage. By the Rev. Dr. Jessopp.

An endeavour to trace the condition of the parish or ecclesiastical geographical unit in England during the thirteenth and fourteenth centuries.

United Kingdom—England. **Murray.**

A Handbook for Travellers in Surrey (including Aldershot). Fifth Edition. With Maps. London: John Murray, 1898. Size 7 × 5, pp. [18] and 450. *Price* 6*s*. *Presented by the Publisher.*

Surrey is made the subject of a special volume in this edition; the information, although arranged in the same manner as formerly, is revised where necessary.

United Kingdom—Ethnographical Survey. ———

British Association for the Advancement of Science, Toronto Meeting, 1897. Fifth Report on the Ethnographical Survey of the United Kingdom. [Proof incomplete.] London: Offices of the Association. Size 8½ × 5½, pp. 58.

United Kingdom—Ireland. *P.R. Dublin S.* **8** (1897): 421–431. **Kilroe.**

The Distribution of Drift in Ireland in its Relation to Agriculture. By J. R. Kilroe. *With Map.*

A note on this paper will be given.

United Kingdom—Ireland. **Martel.**

Mitchelstown Cave. By E. A. Martel. Reprinted from the *Irish Naturalist*, April, 1896. Dublin: Printed by Alex. Thom & Co., 1896. Size 9 × 6, pp. [6]. *Plan. Presented by the Author.*

United Kingdom—Ireland. *Sci. P.R. Dublin S.* **8** (1897): 475–508. **Praeger and Sollas.**

Report of the Committee consisting of Prof. W. J. Sollas, F.R.S., R. Lloyd Praeger, A. F. Dixon, and Alfred Delap, appointed by the Royal Dublin Society to investigate the recent Bog-flow in Kerry. Drawn up by R. Lloyd Praeger and Prof. Sollas. *Map and Plates.*

This is an authoritative account of the great bog-burst near Killarney, which occurred on December 28, 1896.

United Kingdom—Ireland. *T.R. Dublin S.* **5** (1896): 785–822. **Sollas.**

A Map to show the Distribution of Eskers in Ireland. By Prof. W. J. Sollas, LL.D., etc. *With Maps.*

An interesting piece of work, to which further reference may be made.

United Kingdom—Ireland. *P.R. Irish A.* **4** (1897): 542–549. **Westropp.**

The Distribution of "Cromlechs" in the County of Clare. By Thomas Johnson Westropp, M.A. *With Map and Plates.*

United Kingdom—Rainfall. **Gaster.**

Official No. 114. Rainfall Tables of the British Islands, 1866–90. Published by the Authority of the Meteorological Council. London: Eyre and Spottiswoode, 1897. Size 10 × 6, pp. ii. and 284. *Maps. Price* 6*s*. *Presented by the Meteorological Office.*

Tables of actual monthly rainfall for (in Part i.) 492 stations for the years 1881–90, with monthly and annual means for the two five-yearly periods 1881–85, 1886–90; (in Part ii.) for 158 stations for varying periods before 1880; and (in Part iii.) an abstract of the mean monthly and annual rainfalls for the period 1881–90 arranged according to counties taken in geographical order. Mr. R. H. Scott gives a preface stating that the work was done in the Meteorological Office under the charge of Mr. Gaster. There are three sketch-maps showing river-basins. It is interesting to look at this Government publication side by side with the Austrian Hydrographic Service Report referred to on p. 191 of this *Journal*.

United Kingdom—Scotland. **Baddeley and Jordan.**

Black's Guide to the Clyde River, and Firth. Edited by M. J. B. Baddeley, B.A., and E. D. Jordan, B.A. Five Maps and Plans. London: A. & C. Black, 1897. Size 7 × 4½, pp. viii. and 84. *Presented by the Publishers.*

This little guide-book of about 90 pages of reading matter is ballasted with 130 pages of advertisements referring mainly to hotels in other parts of the British Islands.

The guide is fairly up to date; but it does not treat of the features which give to the Firth and Lochs of Clyde their greatest charm and interest for intelligent visitors.

ASIA.

Arabia—Kuria-Muria Islands. **Magistris.**

L. F. de Magistris. Le Isole Curïán-Murïán. (Estr. da "Le Comunicazioni di un Collega," a. III. (1896), n. 3.) Pp. 44–47. *Map.* Size 10 × 7. Also a leaflet on the Area of the Islands from *B.S.G. Italiana* (1896), Fasc. v. *Presented by the Author.*

Asia. *Iz. E. Siberian Sect. Imp. Russian G.T.* **27** (1896): 1-40. **Obrucheff.**

W. Obrutscheff Kurze Uebersicht der von der Kaiserlich-Russischen Geographischen Gesellschaft ausgerüsteten Expeditionen zur Erforschung Asiens. [In Russian.]

An epitome of Russian exploration in Asia from 1846 to 1896, one of the papers presented at the Jubilee of the Russian Geographical Society.

Asia—Central. **Lapparent.**

Dans les sables de l'Asie Centrale. Les voyages de M. Sven Hedin. Par A. de Lapparent. Extrait du *Correspondant.* Paris: L. De Soye et Fils, 1898. Size 9½ × 6½, pp. 22. *Presented by the Author.*

Asia—Central. **Obrucheff.**

Iz. E. Siberian Sect. Imp. Russian G.S. **28** (1897): 144–156.

Sven Hedin's Journey across the Takla-Makan desert, between Kotan and Keria-Dariya, and Lob-Nor. By V. A. Obrucheff. [In Russian; *résumé* in German.]

Asia—Eastern. *Verh. Ges. Erdk. Berlin* **24** (1897): 387–397. **Müller-Beeck.**

Herr Müller-Beeck: Die geographischen Errungenschaften und neuen geographischen Aufgaben in Ost-Asien nach dem japanisch-chinesischen Krieg.

Asia—Eastern. **Orleans.**

From Tonkin to India by the sources of the Irawadi, January, '95—January, '96. By Prince Henri d'Orléans. Translated by Hamley Bent, M.A. London: Methuen & Co., 1898. Size 10½ × 7½, pp. xii. and 468. *Map and Illustrations. Price* 25*s. Presented by the Publishers. A second copy, presented by the Author.*

This will be specially noticed.

Asia Minor, etc. *Petermanns M.* **43** (1897): 249–261, 280–288. **Oberhummer.**

Bericht über eine Reise in Syrien und Kleinasien. Von Roman Oberhummer. *With Map.*

China. *Blackwood's Mag.* **163** (1898): 295–312. ——

The Crisis in China. *With Map.*

China. *Fortnightly Rev.* **63** (1898): 264–279. **Johnstone.**

From Canton to Mandalay. By William Johnstone.

This journey from Canton, occupying six months of 1897, was made *viâ* Mengtze in Yunnan, across the Red river, Ta Lang, Purh-Fu, Sze Mao, across the Mekong, and through the Shan country to Tawnio, Lashio, and Mandalay.

China. *Contemporary Rev.* **73** (1898): 235–240. **Fraser.**

Our Trade with Western China. By John Foster Fraser.

China. **Thomson.**

Through China with a Camera. By John Thomson. London: A. Constable & Co., 1898. Size 9 × 7, pp. xiv. and 284. *Illustrations. Price* 21*s. Presented by the Publishers.*

A special note will be given on this book.

China—Anthropology. *Mém. Couronnés A.R. Belgique* **54** (1896): 1–104. **Harlez.**

Essai d'Anthropologie Chinoise. Par Ch. de Harlez.

This consists of the results of researches in the Chinese classics, mainly in the form of translated extracts.

China—Historical. **Hirth.**

XI. Internationaler Orientalisten-Congress, Paris, September 1897. Über die einheimischen quellen zur Geschichte der Chinesischen Malerei von den ältesten zeiten bis zum 14, Jahrhundert. Von Prof. Dr. Friedrich Hirth. München and Leipzig: G. Hirth's Verlag, 1897. Size 9 × 6, pp. 40. *Presented by the Author.*

This was referred to in the *Journal* for January, p. 67.

China—Kiao-chow. **Hirth.**
Die Bucht von Kiau-tschau und ihr Hinterland. Vortrag des Professors Dr. Friedrich Hirth gehalten am 6 Dezember 1897 in der Abtheilung München der Deutschen Kolonialgesellschaft. Sonder-Abdruck aus den "Münchner Neuesten Nachrichten." München: Knorr & Hirth. Size 7 × 4½, pp. 22. *Map. Presented by the Author.*

A timely lecture delivered to the Munich branch of the German Colonization Society by Prof. Hirth, whose knowledge of the literature bearing on China well fits him to give a conspectus of the existing information regarding Kiao-chow.

China—Manchuria. **Pozdneyeff.**
Description of Manchuria. Issued by the Imperial Ministry of Finance, and edited by Demetrius Pozdneyeff. Vol. i. St. Petersburg, 1897. [In Russian.] Size 10½ × 7, pp. 620. *Map. Presented by M. Venukoff.* Also *Zemlevedenie* 4 (1897): 101–127.

China—Manchuria. *Zemlevedenie* 3, 1896 (1897): 149–157. **Sviyagin.**
Eastern Manchuria. By Sviyagin. [In Russian.]

China—Mongolia. **Klemenz.**
Protocol Troitzkosavsk-Kyakta Br. Amur Sect. Imp. Russian G.S. No. 4 (1896): 5–16.
On the Glaciers of Mongolia. By D. Klemenz. [In Russian.]

China—Mongolia. **Klemenz.**
Iz. E. Siberian Sect. Imp. Russian G.S. 28 (1897): No. 2, 157–159.
Notice on two extinct volcanoes in Khangai Mountains, Northern Mongolia. By D. A. Klemenz. Plan and Profile. [In Russian, summary in German.]

China—Railways. *A travers le Monde, Tour du Monde* 4 (1898): 17–20. **Perrenoud.**
Le chemin de fer de Tientsin à Pékin. Par Alfred Perrenoud. *With Illustrations.*

China—Tibet. *J. Buddhist Text and Anthrop. S.* 5 (1897): 4–23. **Billi.**
A Short Account of the Great Kingdom of Tibet. In 1729 A.D. By Fra Francesco Orazio Della Penna di Billi.

China—Turkistan. **Shaw.**
The History of the Khojas of Eastern-Turkistan, summarized from the Tazkira-i-Khwajagan of Muhammad Sadiq Kashghari, by the late Robert Barkley Shaw. Edited, with Introduction and Notes, by N. Elias. [Published as Supplement to the *Journal* of the Asiatic Society of Bengal, vol. lxvi., part i., 1897.] Calcutta, 1897. Size 9½ × 6½, pp. vi. and 68.

Dutch East Indies. **Van der Kemp.**
Bijd. Taal-, Land- en Volkenk. Ned.-Indië 5 (1898): 8–168.
Het afbreken van onze betrekkingen met Bandjermasin onder Daendels en de herstelling van het Nederlandsch gezag aldaar op den 1ª Januari 1817. Door R. H. van der Kemp.

French Indo-China. **d'Enjoy.**
La Colonization de la Cochin-Chine (Manuel du Colon). Par Paul d'Enjoy. Paris: Société d'Éditions Scientifiques, 1898 [1897]. Size 7½ × 5, pp. 390. *Price 7 fr. 50.*

A general account of Cochin China, dealing mainly with the economic and social conditions, the regulations affecting the acquisition of land, and advice to intending immigrants. A scheme for a railway from Saigon to Tongking is described.

French Indo-China—Tonkin. *Ann. G.* 6 (1897): 431–449. **Billet.**
Le Haut-Tonkin (région de Cao-Bang). Par M. A. Billet. *With Map.*

A careful study of Cao-Bang with regard to physical geography and resources. The map is on the scale of 1 : 300,000.

India. **Raverty.**
The Mihrán of Sind and its Tributaries: a Geographical and Historical Study. By Major H. G. Raverty. [Reprinted from the *Journal*, Asiatic Society of Bengal, vol. lxi. part i., Extra No. 3, 1892.] Calcutta: Printed at the Baptist Mission Press, 1897. Size 9 × 6½, pp. 393–508. *Maps and Plate. Presented by the Author.*

This completes Major Raverty's laborious research into the history of the Mihran of Sind.

India—Ajmer. *Indian Antiquary* 26 (1897): 162–164. **Bühler.**
The Origin of the Town of Ajmer and of its Name. By G. Bühler.

India—Burma ———

Memorandum on the Internal Trade of Burma for the year ending March 31, 1897. Rangoon, 1897. Size 13 × 8½, pp. 8 and xlvi. *Map.*

India—Historical. **Lopes.**

Quarto Centenario do Descobrimento da India. Contribuções da Sociedade de Geographia de Lisboa. Chronica dos Reis de Bisnaga. Manuscripto inedito do Seculo XVI., publicado por David Lopes, S.S.G.L. Lisboa, 1897. Size 10 × 6½, pp. xc. and 124. *Illustrations. Presented by the Hakluyt Society.*

India—Historical. *J. Asiatic S. Bengal* **66** (pt. 1) (1897): 85–112. **Pargiter.**

Ancient Countries in Eastern India. By F. E. Pargiter. *With Map.*

A collection of passages from the Mahabharata and other classics referring to each of the ancient countries of Eastern India.

India—Kashmir—Ladak. *Globus* **73** (1898): 1–8. **Francke.**

Ein Besuch im buddhistischen Kloster Hemis (Ladák). Von Missionar H. Francke. *With Illustrations.*

This article contains many pictures of ceremonial masks worn by the Buddhist monks.

India—Madras. *Globus* **73** (1898): 60–65. **Schmidt.**

Die Mappillas (Morplahs) der Malabarküste. Von Emil Schmidt.

India—Nicobar. *Indian Antiquary* **26** (1897): 217–222. **Man.**

Notes on the Nicobarese. By E. H. Man. No. 1. Numeric System and Arithmetic.

Indian Ports. **Burrard and Roberts.**

Tide-Tables for the Indian Ports for the year 1898 (also January, 1899). Part i.—Western Ports (Aden to Pámban Pass). Part ii.—Eastern and Burma Ports (Negapatam to Port Blair). By Captain S. G. Burrard, and E. Roberts. Size 6½ × 4½, pp. 1140.

India—Poona and the Deccan. **Crawford.**

Our Troubles in Poona and the Deccan. By Arthur Crawford, C.M.G. London: A. Constable & Co., 1897. Size 9 × 6, pp. xx. and 254. *Illustrations. Price* 14*s. Presented by the Publishers.*

The first four chapters contain a brief history of Poona from A.D. 1500: the remaining sixteen discuss various aspects of modern life in Poona and the Deccan, especially as regards the native peoples and their religious and social views. The author protests in the preface against the Hunterian system of spelling Indian names, which he does not adopt in the text.

India—Rajputana. *J. Asiatic S. Bengal* **66** (Pt. 1) (1897): 164–169. **Pandia.**

Separation of Banswara from Dungarpur State in Rajputana. By Mohanlal Vishnulal Pandia.

Indo-China. *Imp. and Asiatic Quarterly Rev.* **5** (1898): 39–55. **Parker.**

The Keng-hung Contention and the Upper Mekong Trade. By E. H. Parker. *With Map.*

Historical account of the Keng-hung district, and a discussion of the future development of the country.

Japan—Proverbs. **Ehmann.**

Die Sprichwörter und bildlichen Ausdrücke der japanischen Sprache. Gesammelt, übersetzt und erklärt von P. Ehmann. Theil II. (von *Gyokuseki* bis *Ki*). Supplement der "Mittheilungen" der Deutschen Gesellschaft für Natur- und Völkerkunde Ostasiens. Tokyo, 1897. Size 9 × 6, pp. 49–144.

A collection of Japanese proverbs phonetically transcribed with German translation and explanatory notes.

Korea. **Bishop.**

Korea and Her Neighbours. A Narrative of Travel, with an Account of the Recent Vicissitudes and present position of the Country. By Mrs. Bishop. With a Preface by Sir Walter C. Hillier, K.C.M.G. 2 vols. London: J. Murray, 1898. Size 8½ × 6, pp. (vol. i.) xviii. and 262; (vol ii.) x. and 322. *Maps and Illustrations. Price* 24*s. Presented by the Author.*

This important work is specially noticed.

Korea. *Fortnightly Rev.* **63** (1898): 222–238. **Parker.**

Corea. By E. H. Parker.

Mainly historical and political.

Malay Archipelago—Java. *Naturw. Wochenschrift* **13** (1898): 13–18. **Fürst.**

Reise durch Javas unabhängige Fürstenthümer. Von Dr. Fürst.

A visit to some of the native states of Java, in order to study the primitive habits of the Javanese.

Malay Archipelago—Java. **Kohlbrugge.**
Tijds. K. Ned. Aard. Genoots. Amsterdam **14** (1897): 695–712.

Geographische Beschrijving van het Janggebergte (Argopoero) op Java. Door Dr. J. H. F. Kohlbrugge. *With Maps.*

The topographical results of a scientific study of the Jang mountains of Java carried out in January, 1897. The geological and zoological specimens collected are being studied by specialists.

Malay Archipelago—Java. **Scidmore.**

Java, the Garden of the East. By Eliza Ruhamah Scidmore. New York: The Century Co., 1897. Size 8 × 5½, pp. xiv. and 340. *Illustrations. Presented by the Author.*

Miss Scidmore is an experienced traveller, and in her lively description of a tour in Java, she is able to compare that island with other tropical countries. The book is mainly a record of impressions during a visit to Batavia, and to the towns and ruined temples along the railway to Djokjakarta. Two chapters are devoted to the "Culture system," the great economic experiment for which Java is famous.

Malay Archipelago—Philippines. *Globus* **73** (1898): 10–12. **Herrmann.**

Besuch im Golddistrikt von Camarines Norte (Luzon). Von Dr. Rafael Herrmann.

Malay Archipelago—Wallace's Line. ———
Tijds. k. Ned. Aard. Genoots. Amsterdam **14** (1897): 758–765.

De geschiedenis van de lijn van Wallace. Door J. F. Niermeyer.

Summary of the results with regard to Wallace's line as a zoogeographical boundary, expressed in Dr. Weber's recently published work on the zoological results of a journey in the Dutch East Indies.

AFRICA.

British South Africa. ———

Rhodesia: its Goldfields and Prospects. Being the Christmas Number of the *Cape Times*. [1897.] Size 17 × 11½, pp. 56. *Portraits and Illustrations. Price* 1*s. Presented by the Editor of the "Cape Times."*

British South Africa. *Contemporary Rev.* **73** (1898): 282–297. **Mackenzie.**

Bechuanaland. By the Rev. John Mackenzie.

Cape Colony. ———

Colony of the Cape of Good Hope. Agricultural and Livestock Returns for 1896–97. Issued in connection with the Statistical Register, 1896. Cape Town: W. A. Richards & Sons, 1897. Size 13½ × 8½, pp. xvi. and 16.

Central Africa. **Gibbons.**

Exploration and Hunting in Central Africa, 1895–96. By A. St. H. Gibbons. London: Methuen & Co., 1898. Size 9½ × 6, pp. xii. and 408. *Portrait, Map, and Illustrations. Price* 15*s. Presented by the Publishers.*

This will be referred to with other books on Africa.

Congo State. *Mouvement G.* **15** (1898): 1–6. **Cerckel.**

Les galeries souterraines de Mokana (Monts Mitumba). Par Lieut. Léon Cerckel. *With Map.*

Congo State. *Mém. Couronnés A.R. Belgique* **53** (1896): 1–368. **Durand and Schinz.**

Études sur la Flore de l'État indépendant du Congo. Par Th. Durand et Hans Schinz.

Congo State—Urua. *Mouvement G.* **14** (1897): 409, 423, 436, 447. **Brasseur.**

L'Urua et le Katanga. Par le commandant Brasseur. *With Map.*

Egypt. **Baedeker.**

Egypt. Handbook for Travellers. Edited by Karl Baedeker. With 22 Maps, 55 Plans, and 66 Views and Vignettes. Fourth Edition. Leipsic: Karl Baedeker;

London: Dulau & Co., 1898. Size 6½ × 4½, pp. cciv. and 396. *Price* 15 *marks. Presented by Messrs. Dulau & Co.*

The two volumes previously devoted to Lower and Upper Egypt have been united for this edition, and the text curtailed by one-third. The whole work has been re-arranged and largely re-written by Prof. Georg Steindorff, of Leipzig, and the number of maps increased. The arrangement adopted provides for general articles on such subjects as the origin and present condition of the Egyptians, by Dr. Schweinfurth: and brief treatises on Egyptian History, Geography, Hieroglyphics, etc., as well as the detailed treatment of routes.

Egypt—Cairo. **Reynolds-Ball.**

Cairo of To-Day: a Practical Guide to Cairo and its Environs. By E. A. Reynolds-Ball, B.A. London: A. & C. Black, 1898. Size 7 × 4½, pp. viii. and 256. *Map and Plan. Price* 2*s.* 6*d. Presented by the Publishers.*

A compact guide-book of convenient size, and with the notable advantages of large type and clear maps. The information given is of a very practical kind; not the least valuable section to a hurried tourist being entitled "What to omit." The information as to hotels is particularly satisfactory.

Egyptian Sudan.

Sudan Almanac, 1898. Compiled in the Intelligence Division, War Office (London). Calculations made at the Nautical Almanac Office. Size 5½ × 4, pp. 26.

Egyptian Sudan. *B.S.G. Marseille* **21** (1897): 324–327. **Léotard.**

Les compétitions européennes dans le Soudan Egyptien. Par M. Jacques Léotard.

French Sudan. *La Géographie* **11** (1898): 159–162. **d'Attanoux and Lolié.**

Le Soudan Français et les campagnes contre Samory. Par MM. J.-B. d'Attanoux et F. Lolié

French West Africa. *Rev. Scientifique* **9** (1898): 11–16. **Dex.**

Notre Transsoudanien. Par M. Léo Dex. *With Map.*

On the proposed railway on French territory from the Senegal to the Niger.

German Colonies. *G.Z.* **3** (1897): 585–588. **Koszmat.**

Die Geologie der deutschen Schutzgebiete in Afrika. Von Dr. Franz Koszmat.

German East Africa—Uhehe. *Globus* **73** (1898): 37–43. **Pfeil.**

Uhehe in Deutsch-Ostafrika. Ein Land für weisse Einwanderer. Von Joachim Graf v. Pfeil. *With Illustrations.*

An attractive description of Uhehe as a healthy country for European settlement. The article is illustrated by sketches from Count Pfeil's water-colours of Uhehe scenery.

Madagascar. *B.S.G. Lyon* **14** (1897): 553–575. **Mœurs, Boussand, and Grosclaude.**

Madagascar. Par MM. Mœurs et Boussand, et Grosclaude.

The record of a visit to Madagascar in 1895, in order to study the mineral resources of the island, concerning which there are useful notes.

Madagascar. *B.S.G. Marseille* **21** (1897): 163–174, 277–285. **Sikora.**

Sept ans à Madagascar. Conférence de M. François Sikora.

Madagascar. **Voeltzkow.**

Wissenschaftliche Ergebnisse der Reisen in Madagaskar und Ostafrika in den Jahren 1889–1895, von Dr. A. Voeltzkow. Einleitung von Alfred Voeltzkow. (Sonderabdruck aus den Adhandlungen der Senckenbergischen naturforschenden Gesellschaft, Band xxi., Heft 1.) Frankfurt a. M., 1897. Size 12 × 9½, pp. 76. *Maps and Plates. Presented by the Author.*

This work is divided into parts relating to Madagascar, Juan de Nova (an island in the Mozambique channel), and Aldabra. The last-named island was visited in 1895, and its description occupies nearly half the memoir. Most attention is paid to fauna, but other natural features are also described, and the people also receive some attention. A number of quarto plates give reproductions of photographs.

Somaliland—Zoology. **Magistris.**

L. F. de Magistris. Risultati zoologici della prima spedizione Bòttego nella Somàlia. Roma, 1896. Size 9 × 6, pp. 8.

South Africa. **Bigelow.**

White Man's Africa. By Poultney Bigelow. London and New York: Harper & Brothers, 1898. Size 9 × 6, pp. xvi. and 324. *Illustrations. Price* 16*s.*

A record of recent history, dealing with the relations of the different states of South Africa since December, 1895.

South Africa. **Coillard.**

François Coillard. Sur le Haut-Zambèze. Voyages et Travaux de Mission. Préface de M. J. de Seynes. Paris: Berger-Levrault & Cie., 1898. Size 11½ × 9, pp. xxviii. and 590. *Portraits, Maps, and Illustrations.* *Price* 15*s.*

This will be referred to elsewhere.

South Africa. *Verh. Ges. Erdk. Berlin* **24** (1897): 475–478. **Passarge.**

Herr Dr. S. Passarge über seine Reisen in Süd-Afrika (Aus einen Brief an Herrn v. Richthofen).

Notes on travel in the Lake Ngami region, with a sketch-map of the environs of the lake.

West Africa. *La G.* **11** (1897): 150–153. **Chanoine.**

La mission Chanoine au Gourounsi. *With Map.*

NORTH AMERICA.

Cabot's Landfall. **O'Brien.**

Presidential Address on Cabot's Landfall. By Most Rev. Archbishop O'Brien, D.D. From the *Transactions of the Royal Society of Canada.* Second Series, 1897–98. Vol. iii. *Proceedings.* Ottawa: J. Durie & Son, 1897. Size 10 × 7, pp. cv.–cxl. *With Map and Chart.*

Canada. ———

Western Canada Manitoba, Assiniboia, Alberta, Saskatchewan, and North-Western Ontario. How to Get There; How to Select Lands; How to Begin; How to Make a Home. 1897. Size 9 × 6, pp. 56. *Map and Illustrations.*

Canada. *Imp. and Asiatic Quarterly Rev.* **5** (1898): 93–119. **Hodgins.**

Canada's Loss by the Treaty of Independence and since. By Thomas Hodgins, Q.C.

A discussion of the manner in which the boundary treaty between Canada and the United States was carried out.

Canada. **Kennedy.**

The Story of Canada. By Howard Angus Kennedy. (The Story of the Empire Series.) London: H. Marshall & Son [1897]. Size 7 × 4½, pp. 176. *Maps.* *Price* 1*s.* 6*d.* *Presented by the Publishers.*

A short but exceedingly clear and accurate account of the rise of Canada, the picturesque history of the French colony bulking much more largely than the settlement and development of the west.

Canada. **White.**

The Topographical Work of the Geological Survey of Canada. By J. White. From the *Geographical Journal* for December, 1897. Size 10 × 6½, pp. 8.

This paper, which was read to the British Association in Toronto by Mr. J. White, was accidentally assigned to Mr. J. B. Tyrrell, when it was published in the *Journal.*

Canada—British Columbia. ———

Eighteenth Annual Report of the British Columbia Board of Trade, together with various Appendices, List of Members, Office Bearers, Commercial Charges, etc. August, 1897. Victoria, B.C.: The Colonist Printing and Publishing Co., 1897. Size 9 × 6, pp. 90. *Map and Illustrations.*

Canada—British Columbia. ———

British Columbia, Canada's most Westerly Province. Its Position, Advantages, Resources, and Climate. New Fields for Mining, Farming, and Ranching along the Lines of the Canadian Pacific Railway. Information for Prospectors, Miners, and Intending Settlers. 1897. Size 9 × 6, pp. 36. *Map and Illustrations.*

Canada—British Columbia. **McCain.**

History of the s.s. *Beaver.* Being a Graphic and Vivid Sketch of this Noted Pioneer Steamer and her romantic Cruise for over Half a Century on the Placid Island-dotted Waters of the North Pacific. Compiled by Charles W. McCain. Vancouver, B.C., 1894. Size 6½ × 5, pp. 100. *Illustrations.* *Presented by Lady Evans.*

A pleasing account of the life-work of the Hudson Bay Co.'s *Beaver* launched on the Thames in the presence of King William IV. in 1834, the first steamer to enter the Pacific, where she plied for over fifty years with her original engines, and was wrecked at the entrance to Burrard's inlet in 1888.

Canada—Irrigation. **Dennis.**
General Report on Irrigation and Canadian Irrigation Surveys for the year 1895, by J. S. Dennis. Annual Report of the Department of the Interior for the year 1896. Pp. 1–112. Ottawa, 1897. Size 10 × 6½. *Maps and Plates.*

Canada—Montreal. ———
Export Trade of the Port of Montreal for Season 1897. Compiled by the Commercial Department of the *Gazette*, Montreal. Size 9 × 6, pp. 78. *Plan.*

Canada—Niagara Falls. ———
The British Association for the Advancement of Science, at Niagara Falls, Saturday, August 21, 1897. Issued by the Local Committee, Niagara Falls, Canada. Size 10½ × 7, pp. [30]. *Map and Illustrations.*

Canada—Ontario. ———
The Gold Fields of Ontario. From the Fifth Report of the Bureau of Mines and Prof. Coleman's Preliminary Report of Work in 1896. Toronto, 1897. Size 10 × 7, pp. vi. and 156. *Map and Illustrations.*
The official account of the new gold-mining districts, with numerous maps and illustrations.

Canada—Ottawa. ———
Guide to the Central Experimental Farm. Prepared for the year 1897, with Information regarding Crops, etc. Ottawa: Government Printing Bureau, 1897. Size 8 × 6, pp. 14. *Plan.*

Canada—Rocky Mountains. *J. School G.* **1** (1897): 293–299. **Wilcox.**
General Features of the Canadian Rockies. By W. D. Wilcox.

Canada—Yukon District. *B.S.G. Lyon* **14** (1897): 620–630. **Cambefort.**
L'Alaska et les Mines d'or du Klondyke. Par M. J. Cambefort.
An account of the new gold fields and the way thither compiled from various sources.

Canada—Yukon District. *Globus* **72** (1897): 357–362. **Bach.**
Der Golddistrikt am Yukonflusse in Nordwest-Amerika. Von R. Bach. *With Map and Illustrations.*

Canada—Yukon District. *G.Z.* **4** (1898): 26–32. **Deckert.**
Die Goldfelder von Klondike. Von Dr. Emil Deckert.

Canada—Yukon District. **Haverly.**
Klondyke and Fortune. The Experiences of a Miner who has acquired a Fortune in the Yukon Valley. By Charles E. Haverly. London: Southwood, Smith & Co. Size 7½ × 5, pp. iv. and 136. *Price* 1*s. Presented by the Author.*
This little book gives the story of the gold discovery at Klondike, told in the first person. The writer explains in the preface, "The editor . . . having ascertained that Mr. Clemens, an experienced Californian miner, had returned with a fortune acquired in the Canadian Yukon, he at once took steps to secure from this gentleman, not only useful facts, but matter interesting to fortune-seekers in the frozen north."

Canada—Yukon District. **Ogilvie.**
Extracts from Reports of Wm. Ogilvie, D.L.S., Boundary and other Surveys in the Yukon District—its gold mines, resources, etc. Annual Report of the Department of the Interior for the year 1896. Pp. 40–55. Ottawa, 1897. Size 10 × 6½.

Mexico and United States. *Trans. Texas A. Sci.* **2** (1897): 33–86. **Townsend.**
On the Biogeography of Mexico and the South-Western United States. II. By C. H. Tyler Townsend.

Red River of the North. **Upham.**
Department of the Interior. Monographs of the United States Geological Survey. Vol. xxv. The Glacial Lake Agassiz. By Warren Upham. Washington, 1895. Size 12 × 9½, pp. xxiv. and 658. *Maps and Plates. Presented by the Survey.*
This magnificent monograph will be the subject of a special notice.

United States—Alaska. **Dall.**
Report on Coal and Lignite of Alaska. By W. H. Dall. Seventeenth Annual Report of the United States Geological Survey . . . 1895–96. Part i. Pp. 771–908. *Maps and Illustrations.* Washington, 1896. Size 12 × 8.

United States—Artesian Wells. **Darton**
Department of the Interior. Bulletin of the United States Geological Survey. No. 138. Artesian Well Prospects in the Atlantic Coastal Plain Region. By N. H. Darton. Washington, 1896. Size 9½ × 6, pp. 232. *Maps and Plates. Presented by the Survey.*

United States—California. **Lindgren.**

The Gold-Quartz Veins of Nevada City and Grass Valley, California. By Waldemar Lindgren. Seventeenth Annual Report of the United States Geological Survey . . . 1895-96. Part ii. Pp. 13-262. *Maps and Illustrations.* Washington, 1896. Size 12 × 8.

United States—California. **Perrine.**

Department of the Interior. Bulletin of the United States Geological Survey. No. 147. Earthquakes in California in 1895. By C. D. Perrine. Washington, 1896. Size 9 × 6, pp. 24. *Presented by the Survey.*

United States—Colorado. **Emmons.**

The Mines of Custer County, Colorado. By S. F. Emmons. Seventeenth Annual Report of the United States Geological Survey . . . 1895-96. Part ii. Pp. 411-472. *Illustrations.* Washington, 1896. Size 12 × 8.

United States—Colorado. **Emmons, Cross, Eldridge.**

Department of the Interior. Monographs of the United States Geological Survey. Vol. xxvii. Geology of the Denver Basin in Colorado. By Samuel Franklin Emmons, Whitman Cross, and George Homans Eldridge. Washington, 1896. Size 12 × 9½, pp. xxii. and 556. *Maps and Plates. Presented by the Survey.*

A complete discussion of the geology of the Denver basin, with a series of beautifully executed maps on the scale of 1 : 125,000, showing the topography, areal geology, economic geology, and geological sections. The short physiographical introduction is illustrated by some photographs of scenery and diagrammatic sections. Most of the other illustrations are drawings of restored fossil vertebrates.

United States—Colorado. **Gilbert.**

The Underground Water of the Arkansas Valley in Eastern Colorado. By G. K. Gilbert. Seventeenth Annual Report of the United States Geological Survey . . . 1895-96. Part ii. Pp. 557-601. *Illustrations.* Washington, 1896. Size 12 × 8.

United States—Dakota. **Darton.**

Preliminary Report on Artesian Waters of a portion of the Dakotas. By N. H. Darton. Seventeenth Annual Report of the United States Geological Survey . . . 1895-96. Part ii. Pp. 609-694. *Maps and Illustrations.* Washington, 1896. Size 12 × 8.

United States—Dakota. **Todd.**

Department of the Interior. Bulletin of the United States Geological Survey. No. 144. The Moraines of the Missouri Coteau and their attendant Deposits. By J. E. Todd. Washington, 1896. Size 9½ × 6, pp. 72. *Map and Illustrations. Presented by the Survey.*

United States—D.C. *National G. Mag.* **8** (1897): 337-344. **Gaillard.**

The Washington Aqueduct and Cabin John Bridge. By D. D. Gaillard. *With Illustrations.*

United States—Geological Survey. **Walcott.**

Seventeenth Annual Report of the United States Geological Survey to the Secretary of the Interior, 1895-96. Charles D. Walcott, Director. In three parts. Part i.—Director's Report and other Papers; Part ii.—Economic Geology and Hydrography. Washington, 1896. Size 12 × 8, pp. (part i.) xxii. and 1076; (part ii.) xxvi. and 864. *Maps and Plates. Presented by the Survey.*

United States—Geology. **Darton and Weeks.**

Department of the Interior. Bulletins of the United States Geological Survey. No. 127. Catalogue and Index of Contributions to North American Geology, 1732-1891, by Nelson Horatio Darton (pp. 1046); No. 130, Bibliography and Index of North American Geology, Paleontology, Petrology, and Mineralogy for 1892 and 1893, by F. B. Weeks (pp. 210); No. 135, Ditto for the year 1894, by the same (pp. 142); No. 146, Ditto for the year 1895, by the same (pp. 130). Washington, 1896. Size 9½ × 6. *Presented by the Survey.*

A massive contribution to bibliography, arranged in one alphabet containing authors', geographical, and stratigraphical names. The state is the geographical unit, the subdivisions under each state being chronological.

United States—Hydrography. **Newell.**

Department of the Interior. Bulletin of the United States Geological Survey. No. 140. Report of Progress of the Division of Hydrography for the Calendar Year 1895. By F. H. Newell. Washington, 1896. Size 9 × 6. *Presented by the Survey.*

United States—Hydrography. *Scottish G. Mag.* **14** (1898): 9-18. **Newell.**

The Hydrography of the United States. By Frederick Haynes Newell. *With Maps and Diagram.*

United States—Illinois. **Leverett.**

The Water Resources of Illinois. By Frank Leverett. Seventeenth Annual Report of the United States Geological Survey . . . 1895-96. Part. ii. Pp. 701-849. *Maps.* Washington, 1896. Size 12 × 8.

United States—Indiana. **Dryer.**

Studies in Indiana Geography. Edited by Charles Redway Dryer, M.A., M.D. First Series. Terre Haute, Ind., the Inland Publishing Co., 1897. Size 11 × 8, pp. 114. *Maps.*

This book is dedicated to Prof. W. M. Davis, in recognition for his efforts to improve the teaching and the study of geography. It is an attempt to give the physical geography of the state on a modern basis.

United States—Irrigation.

Department of the Interior. Water-Supply and Irrigation Papers of the United States Geological Survey. No. 4, A Reconnoissance in South-eastern Washington, by I. C. Russell (pp. 56); No. 5, Irrigation Practice on the Great Plains, by E. B. Cowgill (pp. 38); No. 6, Underground Waters of South-western Kansas, by E. Haworth (pp. 64); No. 7, Seepage Water of Northern Utah, by S. Fortier (pp. 50); No. 8, Windmills for Irrigation, by E. C. Murphy (pp. 48); No. 9, Irrigation near Greeley, Colorado, by D. Boyd (pp. 90). Washington, 1897. Size 9 × 6. *Maps and Illustrations.*

CENTRAL AND SOUTH AMERICA.

Argentine Republic. **Pelleschi.**

Los Indios Matacos y su lengua, por Juan Pelleschi. Con una Introducción, por S. A. Lafone Quevedo. Publicado en el Boletin del Instituto Geográfico, Tomo xvii., Cuadernos 10, 11 y 12 y Tomo xviii., Cuadernos 4, 5 y 6. Buenos Aires, 1897. Size 11 × 7½, pp. 248. *Maps. Presented by the Author.*

Bolivia. **Kramer.**

Pedro Kramer. Un nuevo Departamento. (Proyecto de Ley presentado á la Legislatura da 1896.) La Paz, 1897. Size 8 × 5, pp. 86.

A plea for the establishment of a new department in the north-west of Bolivia.

Bolivia. *Globus* **73** (1898): 21-23. **Nusser-Asport.**

Die Arbeiten zur Feststellung der nordwestlichen Grenzen von Bolivia. Von Chr. Nusser-Asport.

On the boundary fixed by the joint Brazilian and Peruvian Commissioners of 1896, and the position of the boundary stones.

Bolivia and Peru. **Zarco.**

Sociedad Geográfica de La Paz—Bolivia. Cuestión de limites entre Bolivia y el Perú. Breve exposición de los antecedentes y del estado actual del litigio. Por José Zarco. La Paz, 1897. Size 8½ × 6, pp. 116. *Presented by M. V. Ballivian.*

Brazil—Tocantins. **Coudreau.**

Henri Coudreau. Voyage au Tocantins-Araguaya 31 décembre 1896—23 mai 1897. Paris: A. Lahure, 1897. Size 11½ × 9, pp. 298. *Map and Illustrations. Price* 6*s.*

Describes a journey up the Tocantins. Illustrated with a map of the portion of the river traversed on the scale of 1 : 100,000, and numerous views of scenery and portraits of the native tribes. At the end are tables of meteorological observations, etc., and long vocabularies of the Carajá and Cayapó languages.

Chile *Verh. Ges. Erdk. Berlin* **24** (1897): 461-474. **Steffen.**

Die Chilenische Aisen-Expedition. Von Dr. Hans Steffen.

Chile. *J. School G.* **1** (1897): 289-292. **Ward.**

The Climatic Control of Occupation in Chile. By R. De C. Ward.

Colombia. *Naturw. Wochenschrift* **12** (1897): 231, 265, 289, 301, 349. **Regel.**

Reisebriefe aus Colombia. Von Prof. Dr. Fritz Regel.

Peru and Bolivia—Archæology. **Hodge.**

Bandelier's Researches in Peru and Bolivia. By Frederick Webb Hodge. [From the American *Anthropologist* for September, 1897.] Washington, 1897. Size 9½ × 6½, pp. [10]. *Presented by the Author.*

Venezuela. **Vincent and Humbert.**

B.S.G. Com. Bordeaux **20** (1897): 241–246, 381–389, 422–430.

L'instruction publique au Vénézuela. Par Le Dr. L. Vincent et J. Humbert.

A historical account of education in Venezuela during the eighteenth and nineteenth centuries.

West Indies. *Fortnightly Rec.* **63** (1898): 308–320. **Baden-Powell.**

Hope for the West Indies. By Sir George Baden-Powell, K.C.M.G., M.P.

AUSTRALASIA AND PACIFIC ISLANDS.

Australasia—Gold Fields. **Schmeisser.**

Die Goldfelder Australasiens. Unter Mitwirkung des Königlichen Bergassessors Dr. Karl Vogelsang. Herausgegeben von Karl Schmeisser. Berlin: D. Reimer, 1897. Size 11½ × 8, pp. xvi. and 166. *Maps and Illustrations. Price* 12*s.*

This is a record of a long visit of investigation to the goldfields of Australia, Tasmania, and New Zealand, undertaken by Herr Schmeisser, chief of the Prussian Department of Mines, on the part of an English company. The Prussian Government gave him leave of absence on condition of delivering to them the same report as he submitted to the company. This volume contains an account of the journey, maps of the goldfields, and a detailed description of most of them.

Australia. *Deutsche G. Blätter* **20** (1897): 277–287. **Greffrath.**

Geographisch-statistische Übersicht über die australischen Kolonien. II. Die Kolonie Südaustralien. III. Die Kolonie Queensland. Von Henry Greffrath.

Australia—Natural History. *J.R. Colonial I.* **29** (1898): 83–107. **Saville-Kent.**

Australian Natural History Gleanings. By W. Saville-Kent.

Australian English. **Morris.**

Austral English, a Dictionary of Australasian Words, Phrases, and Usages, with those Aboriginal-Australian and Maori Words which have become incorporated in the language, and the commoner scientific words that have had their origin in Australasia. By Edward E. Morris. London: Macmillan & Co., 1898 [1897]. Size 9 × 5½, pp. xxiv. and 526. *Price* 16*s. Presented by the Publishers.*

This is much more than a list of words. Each reference is fortified by quotations so carefully selected, and so generous in their completeness, as to give an adequate description of most of the things sufficiently characteristic of Australasia to have acquired a special name amongst colonists. A curious history is given of the word "Anabranch," which was applied by Colonel Jackson in the R.G.S. *Journal* of 1834 to the branch of a river which reunites lower down with the main stream. While entirely forgotten by the geographers of Europe, this term has been kept alive for the side channels of rivers in Australia; and amusing instances are cited of its being misunderstood even by the editor of the R.G.S. *Journal* a few years after it was first proposed.

British New Guinea. **Macgregor.**

Report in continuation of Despatch No. 34—Ascent of Mambare River, Punishment of Murderers, etc., etc. [No. 42.] Brisbane, 1897. Size 13½ × 9, pp. 8. *Presented by the Colonial Office.*

British New Guinea. **Macgregor.**

Despatch from the Lieut.-Governor of British New Guinea, reporting on the Mambare Massacre. [No. 34.] London: Printed for Her Majesty's Stationery Office, by Darling & Son, 1897. Size 13½ × 8½, pp. 8. *Presented by the Colonial Office.*

Ellice Group. **Hedley.**

Australian Museum, Sydney. Memoir III. The Atoll of Funafuti, Ellice Group: its Zoology, Botany, Ethnology, and General Structure, based on Collections made by Mr. Charles Hedley. Parts 4 and 5. Sydney, 1897. Size 10 × 6½. *Illustrations. Presented by the Australian Museum.*

Part 4 deals with the ethnology, the author being Mr. Charles Hedley; and Part 5 describes some of the zoological collections.

Hawaii—Molokai. *Globus* **73** (1898): 8–10. **Krämer.**

Der Phallusberg von Molokai (Hawaii-Inseln). Von Dr. Augustin Krämer. *Illustrations.*

New Guinea. **Dorsey and Holmes.**

Field Columbian Museum, Publication 21. Anthropological Series. Vol. ii., No. 1. Observations on a Collection of Papuan Crania. By George A. Dorsey. With Notes on Preservation and Decorative Features. By William H. Holmes. Chicago, 1897. Size 10 × 6½, pp. 48. *Illustrations.*

New Hebrides. *A travers le Monde, Tour du Monde* **3** (1897): 409–412. **Saint-Seine.**

Les Nouvelles-Hébrides. Mœurs des Indigènes. Par le Comte Jean Le Gouz de Saint-Seine. *With Illustrations.*

New South Wales. *P.R.S. Victoria* **9** (1897): 22–28. **Kitson.**

Geological Notes on the Gehi and Indi Rivers and Monara Gap, Mount Koscuisko, N.S.W. By A. E. Kitson.

New Zealand. **Dadelszen.**

The New Zealand Official Year-Book, 1897. Prepared . . . by E. J. von Dadelszen, Registrar-General. Wellington, 1897. Size 8½ × 5½, pp. vi. and 568. *Illustrations.*

This year-book is enlarged, and rendered even more useful than hitherto.

New Zealand—Southern Alps. **Kronecker.**

Z. Deutschen u. Oesterreich. Alpenv. **28** (1897): 1–33.

Reisen in den Südlichen Alpen Neuseelands. Von Dr. med. Franz Kronecker. *With Illustrations and Map.*

A mountain tour made in 1894.

Queensland. **Rands.**

Queensland. Eidsvold Gold Field. (Second Report by William H. Rands, Assistant Government Geologist.) Brisbane, 1895. Size 13½ × 8½, pp. 6. *Map.*

Queensland. **Rands.**

Queensland. Report on the Eidsvold Gold Field. (By William H. Rands, Assistant Government Geologist.) Brisbane, 1897. Size 13½ × 9, pp. 6. *Plans.*

Queensland. **Skertchly.**

Queensland. Tin Mines of Watsonville, and various Tin, Silver, Copper, and Gold Mines at Herberton, Montalbion, Irvinebank, Muldiva, Calcifer, Chillagoe, California Creek, the Tate River, etc.; also Geological Notes on Myola, on the recovery of lost Lodes, and on the Copper Plant. (Report by Sydney B. J. Skertchly, Assistant Government Geologist.) Brisbane, 1897. Size 13½ × 8½, pp. 64. *Maps and Sections.*

Queensland. **Skertchly.**

Queensland. Deep (Tin) Lead, Herberton. (Report on the). [By Mr. S. B. J. Skertchly.] Brisbane. Size 13½ × 8½, pp. 16. *Maps and Sections.*

Queensland—Geological Survey. ———

Queensland. Annual Progress Report of the Geological Survey for the year 1895. With four maps. Extracted from the Annual Report of the Under Secretary for Mines, for the year 1895. Brisbane, 1896. Size 13½ × 8½, pp. 28.

Victoria. *P.R.S. Victoria* **9** (1897): 34–53. **Lucas.**

On some Facts in the Geographical Distribution of Land and Fresh-water Vertebrates in Victoria. By A. H. S. Lucas, M.A., B.SC.

A note on the conclusions arrived at in this paper will be given.

MATHEMATICAL GEOGRAPHY.

Cartography. **Gelcich, Sauter, Dinse.**

Sammlung Göschen. Kartenkunde geschichtlich dargestellt von E. Gelcich und F. Sauter. Zweite . . . Auflage. Von Dr. Paul Dinse. Leipzig: G. J. Göschen, 1897. Size 6½ × 4½, pp. 168. *Illustrations. Price* 1*s. Presented by Dr. Paul Dinse.*

An excellent little text-book, packed closely with a remarkable amount of accurate and clearly expressed instruction on projections and map-drawing.

Fixing Positions. **Harzer.**

Ueber geographische Ortsbestimmungen ohne astronomische Instrumente. Elementare Darstellung von Dr. Paul Harzer. Dr. A. Petermanns Mitteilungen, Ergänzungsheft. No. 123. Gotha: Justus Perthes, 1897. Size 11 × 7½, pp. viii. and 128.

This will be specially noticed.

Geodesy. *Ann. Hydrographie* **25** (1897): 535–542. **Neumayer.**

Zur Geschichte der Pendelbeobachtungen. Ein Vortrag, gehalten in der "Gesellschaft Deutsches Naturforscher und Aerzte," geodätisch-geographische Abtheilung, im September, 1897. Von Dr. Neumayer.

Geodesy—Gravity.

Veröffentlichungen des Hydrographischen Amtes der Kaiserlichen und Königlichen Kriegs-Marine in Pola. Gruppe iii. Relative Schwerebestimmungen durch Pendelbeobachtungen. I. Heft. Beobachtungen in den Jahren 1893–1896 während der Reisen S. M. Schiffe "Fasana," "Donau," "Aurora," und "Miramar." Pola, 1897. Size 13 × 10, pp. vi. and 76. *Plate.*

Map Projections. *Rev. G. Italiana* **4** (1897): 489–501, 554–560. **Saija and Marinelli.**

Saggio di una classificazione elementare delle proiezioni geografiche dei professori Giuseppe Saija e Olinto Marinelli.

Mathematical and Physical Geography. **Wosnessenssky.**

Iz. E. Sib. Sect. Imp. Russian G.S. **27** (1896): 102–120.

A. Wosnessenssky. Ueber die Thätigkeit der Kaiserlich-Russischen Geographischen Gesellschaft auf dem Gebiete der mathematischen und physischen Geographie. [In Russian.]

Time and Longitude. *C. Rd.* **126** (1898): 192–194. **Sarrauton.**

Sur le Système de l'heure decimale, les divisions du jour et du circle, et la Table géographique. Mémoire de M. Henri de Serrauton.

PHYSICAL AND BIOLOGICAL GEOGRAPHY.

Astronomy. *Rev. Scientifique* **8** (1897): 481–486, 711–717. **Leclère.**

Le Zodiaque cambodgien. Par M. Adhémard Leclère.

Coral Reefs. *G.Z.* **3** (1897): 514–529, 566–581, 634–643. **Langenbeck.**

Die neueren Forschungen über die Korallenriffe. Von Dr. R. Langenbeck.

A thorough and careful analysis of the theories of coral formation resulting from the study of existing and fossil reefs, leading to the conclusion that fringing and shallow-water reefs are formed in regions which are either stationary or undergoing elevation, while barrier reefs and atolls characterize regions of subsidence.

Geomorphology. *J. Geology* **5** (1897): 809–812. **Smith.**

A Note on the Migration of Divides. By Wm. Sidney Tangier Smith. *Diagrams.*

A study, suggested by San Clemente island lying off the south coast of California, of "the effect on a previously established drainage system of faulting with consequent migration of divides."

Geomorphology. **Suess.**

La Face de la Terre (Das Antlitz der Erde), par Ed. Suess. Traduit de l'Allemand, avec l'autorisation de l'auteur et annoté sous la direction de Emm. de Margerie. Avec une Préface, par Marcel Bertrand. Tome i. Paris: A. Colin et Cie., 1897. Size 10 × 6½, pp. xvi. and 836. *Maps and Illustrations. Presented by the Publishers.*

This will be noticed in the Monthly Record.

Lakes. *Nature* **57** (1898): 321–322. **Wheeler.**

Undulations in Lakes and Inland Seas due to Wind and Atmospheric Pressure. By W. H. Wheeler.

A summary of recent results on seiches and similar phenomena.

Meteorology—Sunspots. *Rev. Scientifique* **8** (1897): 783–786. **Duponchel.**

Les taches solaires et les variations de la température. Par M. A. Duponchel.

Oceanography. *J. School G.* **2** (1898): 16–20. **Davis.**

Winds and Ocean Currents. By W. M. Davis.

Oceanography. **Herdman, Thompson, and Scott.**

On the Plankton collected continuously during two traverses of the North Atlantic in the summer of 1897, with descriptions of new species of Copepoda; and an Appendix on dredging in Puget Sound. By W. A. Herdman, F.R.S.; J. C. Thompson, F.L.S.; and Andrew Scott. [From Trans. L'pool Biol. Soc. Vol. xii. Read November 12, 1897.] Liverpool: T. Dobb & Co., 1897. Size 8½ × 6, pp. [58]. *Plates. Presented by Prof. W. A. Herdman, F.R.S.*

This describes a method of collecting plankton on board an ocean steamer continuously throughout the voyage, and records the results of the application on two voyages between Liverpool and the St. Lawrence.

Oceanography. *Naturw. Wochenschrift* **12** (1897): 518–523, 529–536. **Hjort.**

Untersuchungen über die Organismen und Stromverhältnisse im norwegischen Nordmeere. Von Dr. Johan Hjort. *With Diagrams.*

Oceanography. *Petermanns M.* **43** (1897): 273–279. **Lindenkohl.**

Das spezifische Gewicht des Meerwassers im Nordost-Pacifischen Ozean im Zusammenhange mit Temperatur- und Strömungszuständen. Von A. Lindenkohl. *With Map.*

The map shows the surface salinity of the North-East Pacific from data derived from all the expeditions which have studied that ocean.

Oceanography—Animal Life. *C. Rd.* **126** (1898): 275–277. **Locard.**

Sur l'existence d'une faune malacologique polybathyque dans les grands fonds de l'Atlantique et de la Méditerranée. Note de M. Arnould Locard.

Oceanography—Currents. *C. Rd.* **126** (1898): 293–295. **Thoulet.**

Considérations sur la circulation océanique dans le golfe de Gascogne. Note de M. J. Thoulet.

A note on this will be given.

Oceanography—Currents. *B.S.G. Marseille* **21** (1897): 254–264. **Thoulet.**

De l'emploi d'épaves artificielles pour l'étude des courants marins. Par M. J. Thoulet.

This will be referred to elsewhere.

Oceanography—Gulf of St. Laurence. *Ann. Hydrographie* **25** (1897): 542–547. **Schott.**

Dritter Beitrag zur Hydrographie des St. Lorenz-Golfes. Von Dr. Gerhard Schott. *With Map.*

A summary, with critical remarks, of Mr. W. Bell Dawson's report on the currents in the Gulf of St. Lawrence.

Oceanography—North Sea. *Scottish G. Mag.* **13** (1897): 636–645. **Fulton**

The Surface Currents of the North Sea. By T. Wemyss Fulton, M.B. *With Maps and Illustration.*

Oceanography—Red Sea. **Gräffe.**

Vorläufiger Bericht über die mikroskopischen organismen des aus der Tiefe des Rothen-Meeres gedredschten Schlammes der Expedition S. M. Schiffes "Pola" in den Jahren 1895 bis 1896. Von Dr. E. Gräffe. (Aus den Sitzungsberichten der Kaiserl. Akademie der Wissenschaften in Wien, Mathem.-naturw. Classe; Bd. cvi. Abth. I. October 1897.) Size 9½ × 6½, pp. 8.

Oceanography—Red Sea. **Steuer.**

Vorläufiger Bericht über die pelagische Thierwelt des Rothen Meeres. Von Dr. Adolf Steuer. (Aus den Sitzungsberichten der Kaiserl. Akademie der Wissenschaften in Wien, Mathem.-naturw. Classe; Bd. cvi. Abth. I. Juli 1897.) Wien, 1897. Size 10 × 6½, pp. 18. *Map.*

Physical Geography. **Günther.**

Handbuch der Geophysik. Von Dr. Siegmund Günther. Zweite Auflage. Erster Band. Stuttgart: F. Enke, 1897. Size 10 × 6½, pp. xii. and 648. *Illustrations. Price* 15*s.*

The author explains that only the skeleton of the book remains unchanged. While the subdivisions are the same as in the first edition, the work itself has been entirely rewritten. It deals with the place of the Earth in the Universe, the size and form of the Earth, mathematical geography, the physical conditions of the crust, terrestrial magnetism and the aurora. An important historical chapter, indicating the manner in which the modern science of geography arose, is prefixed.

Physical Geography Models. **Davis and Curtis.**

P. Boston S. Nat. Hist. **28** (1897): 85–110.

The Harvard Geographical Models. By William Morris Davis. With a Note on the Construction of the Models. By G. C. Curtis. *With Plates.*

This will be referred to in a note.

ANTHROPOGEOGRAPHY AND HISTORICAL GEOGRAPHY.

Historical—Cosmas. **McCrindle.**

The Christian Topography of Cosmas, an Egyptian Monk. Translated from the Greek, and Edited, with Notes and Introduction, by J. W. McCrindle, M.A. [Hakluyt Society Publication, No. xcviii.] London: Printed for the Hakluyt Society, 1897. Size 9 × 6, pp. xii., xxviii., and 398. *Plates. Presented by the Hakluyt Society.*

Mr. McCrindle has translated the whole text of Cosmas into English for the first time, thus rendering accessible one of the most important pieces of literature in the history of geography. Cosmas wrote before the knowledge of the ancient Greek geographers had been lost sight of, and his arguments against the true form of the Earth

are curiously like those of the Earth-flatteners of to-day. He probably did more than any other man to arrest the progress of geography; and the notes added by Mr. McCrindle, Mr. Coles, and Dr. Burgess demonstrate very clearly the various fallacies which misled him.

Historical Geography. **Hamy.**

Études historiques et géographiques. Par le Dr. E.-T. Hamy. Paris: E. Leroux, 1896. Size 10 × 6¼, pp. viii. and 480. *Maps.* *Price* 20*s.*

A collection of twenty memoirs, followed by eight appendices dealing with various questions of interest in the history of geography from 1332 to 1804. The longest paper is on the sources of the cartography of Northern Europe.

Historical—Glareanus. **Elter.**

Antonii Elter P.P.O. de Henrico Glareano geographo et antiquissima forma 'Americae' commentatio. Bonnae. Size 11½ × 9, pp. 30. *Facsimile Maps.*

A discussion of several maps by H. Glareanus, dated 1510 onwards, containing the name America, and of Stobnicza's map in the Cracow edition of Ptolemy, published 1512. These maps are reproduced. A note on the subject appeared in the September *Journal*, vol. x. (1897), p. 328.

BIOGRAPHY.

Joest. *Globus* **73** (1898): 46–48. **Andree.**

Wilhelm Joest. Von Richard Andree. *With Portrait.*

Prof. Wilhelm Joest, born March 15, 1852, in Cologne, was distinguished as a scientific traveller in all parts of the world, devoted his attention mainly to anthropology, and died on November 25, 1897, in the Melanesian island of Santa Cruz.

Maples. ———

Chauncy Maples, D.D., F.R.G.S., Pioneer Missionary in East Central Africa for Nineteen Years, and Bishop of Likoma, Lake Nyasa A.D. 1895. A sketch of his Life, with selections from his letters. By his Sister. With Portraits and a Map. London: Longmans & Co., 1897. Size 8 × 5¼, pp. viii. and 404. *Price* 7*s.* 6*d.* *Presented by the Publishers.*

This will be specially noticed.

Marco Polo. *Deutsche Rundschau G.* **20** (1898): 181–185. **Wolkenhauer.**

Marco Polo. Von W. Wolkenhauer. *With Portrait.*

Marsigli. *Rev. Scientifique* **8** (1897): 801–805. **Thoulet.**

Un des fondateurs de l'océanographie, Marsigli. Par M. J. Thoulet.

Marsigli lived from 1658 to 1730, and was the author of a work on the physical history of the sea, on account of which M. Thoulet hails him as "the father of oceanography."

Nansen. **Stephen.**

Nansen. By Leslie Stephen.—From *International Journal of Ethics*, vol. viii., No. 1, October, 1897, pp. 1–22. Size 10 × 6½.

This essay takes Nansen's expedition as the text for a discourse on the ethics of adventure, looking on the matter, not from the view-point of science, but of sport. The conclusion is that such enterprises are worthy of commendation.

Raffles. **Boulger.**

The Life of Sir Stamford Raffles. By Demetrius Charles Boulger. London: H. Marshall & Son, 1897. Size 10½ × 7, pp. xvi. and 404. *Portraits, Maps, and Illustrations.* *Price* 21*s.* *Presented by the Publishers.*

A separate note will be given on this book.

Seemann. *Ann. Hydrographie* **25** (1897): 422–424. ———

Karl Hinrich Seemann, geboren den 19 Januar 1843 in Cuxhaven, gestorben den 24 September 1897 in Hamburg.

Captain Seemann (1843–1897), a student of climatology, was an assistant in the German Naval Observatory.

Seler. *Deutsche Rundschau G.* **20** (1897): 133–136. ———

Dr. Eduard Seler. *With Portrait.*

Dr. Seler is a prominent authority on the anthropology of America.

Villegagnon. **Heulhard.**

Arthur Heulhard. Villegagnon, roi d'Amérique un homme de mer au XVI^e^ Siècle (1510–1572). Paris: E. Leroux, 1897. Size 13 × 10½, pp. vi. and 366. *Illustrations.*

The biography of one of the most remarkable adventurers of the sixteenth century, with interesting reproductions of ancient illustrations and contemporary maps, relating largely to the Brazilian colony known as "La France Antarctique," which he founded.

Wells. *Deutsche Rundschau G.* **20** (1898): 185–186. **Greffrath.**

Charles Frederick Wells. Von H. Greffrath. *With Portrait.*

Mr. Wells perished in the Calvert expedition across the great desert in Australia.

Zannoni. *Rev. G.* **41** (1897): 401–413. **Drapeyron.**

J.-A. Rizzi Zannoni, géographe italien (1736–1814). Son séjour en France (1757–1776). Par L. Drapeyron.

Zannoni, a native of Dalmatia, was the first hydrographic engineer of the French navy, and a diligent cartographer.

GENERAL.

Almanac. ———

Annuaire pour l'an 1898, publié par le Bureau des Longitudes. Avec des Notices scientifiques. Paris: Gauthier-Villars et Fils. Size 6 × 4, pp. vi., 660, 36, 16, 40, 4, 12, 38.

Almanac. **Olsen.**

1898. The Fisherman's Nautical Almanack and Tide Tables. A Directory of British and Foreign Fishing Vessels, Steamers, etc. By O. T. Olsen. London: J. D. Potter, etc. Size 7½ × 5, pp. 418. *Plan. Presented by the Compiler.*

Asia and Europe—Magnetic Observations. **Fritsche.**

Observations magnétiques sur 509 lieux faites en Asie et en Europe pendant la période de 1867–1894. Par Dr. H. Fritsche. St. Petersbourg, 1897. Size 9 × 6½, pp. 44. *Maps. Presented by the Author.*

Photolithographed tables, maps, and notes on magnetic observations.

Bibliography. **Ritchie.**

Occasional Publications, No. 2. List of the Books in the English Language on Travel, Exploration, and Mountaineering. Published within the Year ending August Thirty-First, 1897. Prepared by John Ritchie, Jr., Librarian of the Society. Boston: Boston Scientific Society, 1897. Size 9 × 6, pp. 18. *Presented by the Author.*

Useful in containing the titles of some books of travel published in the United States, which have not been prominently brought before the British public.

Book of Reference. **Trübner.**

Minerva. Jahrbuch der Gelehrten Welt. Herausgegeben von K. Trübner. Siebenter Jahrgang, 1897–98. Strassburg: Karl J. Trübner, 1898. Size 6½ × 4½, pp. xxiv. and 1130. *Portrait.*

This invaluable work of reference is enlarged and improved, taking account of the chief learned Societies as well as the Universities of the world. The new volume has a fine etching of Dr. Nansen as frontispiece.

British Colonies. ———

Combined Circulars on Canada, and the Australasian and South African Colonies. Circulars Nos. 1–3. January 1, 1898. London: Emigrants' Information Office. Size 8½ × 5½, pp. 14, 42, 16. *Sketch-Map.*

The first of a new series of circulars to be issued quarterly and supplied free of charge to any one applying for them. They give recent official information as to the conditions of the various colonies, the demand for immigrants, the necessary outfits, passage-rates, etc.

Calendar. **Meyer.**

Meyers Historisch-Geographischer Kalender auf das Jahr. 1898. Leipzig und Wien: Bibliographisches Institut. Size 10 × 6½, pp. iv. and 365. *Illustrations.*

A pictorial "tearing-off" calendar, with the picture of some important town or portrait of some famous man for every day of the year. It seems singularly well adapted for arousing interest in geographical and historical matters.

Educational. [**Herbertson.**]

British Association for the Advancement of Science. Toronto, 1897. The Position of Geography in the Educational System of the Country. Report of the Committee. Size 8½ × 5½, pp. 42. *Presented by the Secretary of the Committee.*

A special note on this Report will be given.

Educational—Methods. *Scottish G. Mag.* **14** (1898): 24–29. **Davis.**

Geography as a University Subject. By Prof. William Morris Davis. (Read at the Meeting of the British Association, Toronto, 1897.)

Educational—Methods. **Farnham.**

The Oswego Normal Method of Teaching Geography, prepared for the Practice Department of the Oswego State Normal and Training School of Oswego, N.Y. By Amos W. Farnham. Syracuse, N.Y.: C. W. Bardeen, 1896. Size 7 × 5, pp. 128.

This little book is clear and practical, giving useful hints for teaching geography as an observational science without a book and from the earliest period of school life. While some of the work is applicable to America alone, and some of the methods represent the author's personal views, it is worthy of attention in this country.

Educational—Methods. *G.Z.* **3** (1897): 680–694. **Rittau.**

Das Entwerfen von Kartenskizzen im Unterricht und die Bestimmungen der neuen Lehrpläne darüber. Von Dr. Rittau.

Dr. Rittau controverts Dr. Bludau's objections to the practice of map-drawing in schools, and maintains the usefulness and educational character of such work.

Educational—Textbook. **Mill.**

Pitt Press Series. Elementary Commercial Geography. By Hugh Robert Mill, D.SC. Cambridge: The University Press, 1897. Size 7 × 5, pp. 196. *Price* 1*s.* 6*d. Presented by the Author.*

Revised to the end of 1897.

NEW MAPS.

By J. COLES, *Map Curator*, R.G.S.

EUROPE.

England and Wales. **Bartholomew**

Reduced Ordnance Survey of England and Wales. Scale 1: 126,720 or 2 stat. miles to an inch. Sheets: 15, Norfolk; and 20, Suffolk. John Bartholomew & Co., Edinburgh. *Price* 2*s. each. Presented by the Publishers.*

These two maps form part of the "Reduced Ordnance Survey Series" of England and Wales, in course of publication by John Bartholomew & Co. They are orographically coloured in six shades.

England and Wales. **Ordnance Survey.**

Publications issued since January 8, 1898.

1-inch—General Maps (revision):—

ENGLAND AND WALES:—23, 31, 38, 40, 58, 65, 66, 110, 137, 247, 261 and 262, 275 and 291, 292, 345, engraved in outline. 1*s.* each.

6-inch—County Maps (revision):—

ENGLAND AND WALES:—**Essex,** 32 S.E., 34 N.W., S.E., 35 N.E., 41 S.E., 42 N.E., S.E., 44 S.W., 45 S.W., 49 N.E., S.E., 50 S.W., 51 S.W., 53 S.E., 55 N.W., 57 S.E., 58 N.W., 59 S.W., 63 S.E., 64 N.W., 69 S.E., 70 S.W., 72 N.W., 76 N.E. **Hampshire,** 60 N.E., 63 S.E., 64 N.E., 66 N.W., 67 S.W., 68 S.W., 71 N.E. **Hertfordshire,** 47 N.E. **Kent,** 16 S.W., 17 S.W., 29 N.W., 30 S.W., 39 S.E., 41 N.W., 49 S.E., 50 N.W., N.E., 51 N.W. **Middlesex,** 9 N.E., 11 N.E., 12 N.E., 15 S.E., 16 S.W., 21 N.W., 22 N.W., 23 N.W., 24 N.E., 25 N.E. **Northumberland,** 50 S.W., 58 S.W., 77 S.W. **Surrey,** 5 S.W., S.E., 10 S.E., 12 S.W., S.E., 17 N.E., S.W., S.E., 19 N.W., 20 S.W., 24 N.W., N.E., S.W., 25 S.E., 26 N.W., N.E., 27 N.E., 32 N.W., 33 S.E., 34 N.E., 35 N.E., 39 N.E., 42 N.E. **London,** 2 N.E., 3 N.E., 5 S.E., 6 S.W., 8 S.E., 10 N.W., 11 N.W., 12 N.W., N.E., 13 N.E., 16 N.W.

25-inch—Parish Maps (revision):—

ENGLAND AND WALES:—**Cheshire,** XIX. 15; XX. 13; XXVIII. 2, 7; XXIX. 1; XXXV. 8, 16; XXXVI. 2, 5, 9, 13; XLII. 4, 12, 16; XLIII. 1, 5, 10, 13; L. 4, 12; LI. 1. **Durham,** V. 2; X. 10, 11, 15, 16; XLV. 15; L. 3, 4, 10, 14, 15; LI. 1, 3, 5; LV. 9; LVI. 2, 6, 10, 13, 14; LVII. 3; LVIII. 2, 6. **Essex,** IV. 6, 8; V. 4; VI. 2, 6, 7, 15; VIII. 9, 13; XII. 4; XIII. 1, 5, 6, 10; XVIII. 1, 3; XIX. 1, 5; XX. 5, 6, 8; XXI. 9, 13; XXII. 10; XXVII. 8, 12; XXX. 2, 14; XXXIX. 2, 3, 10; XLIV. 11. **Hampshire,** LXXV. 3, 7, 11, 12; LXXXIV. 3, 12, 15 and 16; LXXXIX. 16; XC. 6, 16; XCI. 10; XCVI. 3, 6, 10. **Hertfordshire,** VIII. 1, 6, 9, 11, 12, 14; IX. 13; XIII. 1, 2, 3, 4, 7, 12; XIV. 1, 2, 5, 6, 7, 11, 14, 15, 16; XXII.

2, 3, 6, 7, 8, 10, 11; XXXV. 10; XXXVI. 10; XXXIX. 2, 7, 8, 10, 11, 12, 16; XL. 5, 9, 13. **Kent,** VIII. 1; IX. 3, 4, 6, 8, 15, 16; XI. 14; XIX. 2; XXI. 7, 10; XXXIV. 8, 12, 15, 16; XXXV. 2, 6; XLV. 11, 13, 16; LV. 10, 13, 15; LVI. 1, 2, 5, 6, 7, 8, 12, 14; LIX. 1; LXV. 1, 3, 7, 8, 11, 12, 13, 14, 15, 16; LXVI. 1, 2, 4, 5, 6, 9, 10, 11. **Northumberland,** IX. 16; X. 12, 13, 15, 16; XI. 9, 11, 14, 15; XIII. 2, 4, 7, 8, 11, 12, 15, 16; XIV. 1, 2, 3, 4, 5, 6, 7, 12, 13; XV. 1, 2, 3, 5, 6, 7, 11; XVII. 14; XVIII. 4, 8, 12, 16; XIX. 1, 2, 4, 5; XX. 3, 14; XXXI. 16; XXXII. 6, 9, 11, 12, 14; XXXVIII. 4; XXXIX. 6; CVI. 12; CVII. 2, 3, 6, 7.

Surrey, XXII. 11, 12, 15; XXX. 13; XXXVII. 2, 5, 9; XLIV. 6 and 7, 8, 11, 12. **Sussex,** X. 8; XXI. 1; XXXVIII. 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16; XXXIX. 1, 2, 4, 5, 7, 8, 10, 11, 14, 15, 16; LII. 2, 3, 8, 10, 11, 12; LIII. 2, 3, 5, 6, 7, 8, 9, 11, 12; LXI. 1, 2, 3; LXII. 1; LXIII. 4, 5, 8, 9, 12.
(E. Stanford, Agent.)

Germany. **Königl. Preuss. Landes-Aufnahme.**
Karte des Deutschen Reiches. Herausgegeben von der Kartogr. Abtheilung der Königl. Preuss. Landes-Aufnahme 1897. Sheets: 455, Eupen; 456, Euskirchen. Scale 1 : 100,000 or 1·5 stat. mile to an inch. *Price* 1.50 *mark each sheet.*

Historical Geography. **Poole.**
Historical Atlas of Modern Europe from the Decline of the Roman Empire; comprising also maps of parts of Asia and of the New World connected with European History. Edited by Reginald Lane Poole, M.A., PH.D., Lecturer in Diplomatic in the University of Oxford. Part XV. Oxford: The Clarendon Press; London, Edinburgh, and Glasgow; Henry Frowde, M.A.; Edinburgh: W. & A. K. Johnston. 1898. *Price* 3*s.* 6*d. each part. Presented by the Clarendon Press.*

This part contains: Map 27, Scotland about the year 1600, by G. Gregory Smith, M.A.; Map 61, The Spanish Peninsula, showing the Ecclesiastical Divisions from the thirteenth century, by the Editor; and Map 78, Western Asia under the Mohammedan Dynasties, about 970 and 1070 A.D., by S. Lane Poole, M.A. These maps are accompanied by letterpress by the several authors.

Italy. **Instituto Geografico Militare, Firenze.**
Carta d'Italia. Scale 1 : 100,000 or 1·5 stat. mile to an inch. Sheets: 7, Pizzo Bernina; 11, M. Marmolada; 22, Feltre; 26, S. Pietro Al Natisone; 33, Bergamo; 46, Treviglio; 88, Imola. Instituto Geografico Militare, Firenze. *Price* 1 *li* 50 *centimes each sheet.*

ASIA.

Asia Minor. **Oberhummer.**
Routen-Aufnahmen in Kleinasien ausgeführt im Herbst 1896 von Roman Oberhummer. Scale 1 : 500,000 or 7·8 stat. miles to an inch. *Petermanns Geographische Mitteilungen,* Jahrgang 1897, Tafel 18. Gotha: Justus Perthes, 1897. *Presented by the Publisher.*

Borneo. **Nieuwenhuis.**
Karte des Mahakam-Flusses in Borneo. Scale 1 : 2,000,000 or 31 stat. miles to an inch. Bv Dr. A. W. Nieuwenhuis. *Petermanns Geographische Mitteilungen,* Jahrgang 1898, Tafel 2. Gotha: Justus Perthes. *Presented by the Publisher.*

AFRICA.

German East Africa. **Triloff.**
Die Schambalai oder West-Usambara. Nach einer Skizzenkarte des Missionars F. Lang-Heinrich in Wuga und verschiedenen gedruckten und ungedruckten Quellen, bearbeitet von P. Hermann Triloff. Scale 1 : 200,000 or 3·1 stat. miles to an inch. Gotha: Justus Perthes, 1897. *Petermanns Geographische Mitteilungen,* Jahrgang, 1897, Tafel 20. *Presented by the Publisher.*

Niger. **Caron, Lefort.**
Atlas du Cours du Niger entre Manambougou et Tombouctou. Scale 1 : 50,000 or 1·5 stat. mile to an inch. Cartes levées par E. Caron, Lieutenant de Vaisseau, et P. Lefort, Lieutenant d'Infanterie de Marine. Dressées par J. Hansen, Cartographe de la Société de Géographie de Paris. Paris, 1898. 42 sheets.

This is an important atlas consisting of 41 sheets, and an index map, of the upper Niger between Manambugu and Timbuktu. A line of sounding is given throughout the course of the river between these points, as well as notes on the nature of the country passed through by the surveyors.

AMERICA.

Labrador. **Geological Survey of Canada.**

Geological Map of Labrador. Scale 1:1,584,000 or 24·6 stat. miles to an inch. Geological Survey of Canada, 1896. *Presented by the Publishers.* 4 sheets.

This map, which has been compiled from the most recent material, has for its primary object the illustration of the geology of Labrador peninsula, but in addition to this, it is the best map of this region that has been published, and exhibits the results of all explorations up to 1897.

Yukon Gold Fields. **Year Book of British Columbia.**

Map of the Canadian Yukon and Northern Territory of British Columbia. Compiled and engraved for the Year Book of British Columbia, by the Province Publishing Company, Limited, Victoria and Vancouver. Scale 1:654,480 or 18 stat. miles to an inch. 1897.

This is a preliminary map without any hill shading. It shows part of Alaska and northern British Columbia, where the Yukon goldfields are situated. It has been published as recently as January last by a Government Department, and therefore such information as it gives may be taken as the most recent and reliable with regard to the Klondike district.

AUSTRALIA.

Australia. **Hassenstein.**

Karte von Horns Expedition in Zentral-Australien unter Führung von Ch. Winnecke, 1894. Mit Benutzung aller früheren Reisen und Aufnahmen entworfen u. gezeichnet von Dr. B. Hassenstein. Scale 1:1,500,000 or 23·5 stat. miles to an inch. *Petermanns Geographische Mitteilungen*, Jahrgang 1898, Tafel 1. Gotha: Justus Perthes. *Presented by the Publisher.*

GENERAL.

World. **Johnston.**

Johnston's Commercial and Library Chart of the World, on Mercator's Projection. W. & A. K. Johnston, Edinburgh, 1898. 4 sheets. *Presented by the Publishers.*

This map has been brought up to date, and gives a large amount of information with regard to means of communication by land and sea, coaling-stations, naval stations, currents, and depths of the ocean. In addition to this, maps on an enlarged scale are given of Central Europe, the principal British possessions, the Suez Canal and Nile Delta, and the Isthmus of Panama. The map is nicely drawn, and is well suited for general reference in the library or office.

World. **Johnston.**

Royal Atlas of Modern Geography. W. & A. K. Johnston, Edinburgh, 1898. *Price* £6 6*s.* *Presented by the Publishers.*

Several additions have been made in the present edition of this atlas. As regards America, the map of the United States on three sheets, which appeared in the last edition, has been replaced by one on four sheets drawn on a larger scale; a new map of Central Canada has also been added. We draw attention to certain corrections and additions which should have been made. On the north polar chart, notwithstanding that Dr. Nansen reached the farthest north ever attained, no notice whatever is taken of it, though the farthest north of other explorers is given; neither is any of the new work in Franz Josef Land shown, nor is it shown correctly on the Mercator map of the world. On the map of South Africa, the railways have not been brought up to date, the Buluwayo railway not being shown as opened beyond Palachwe; this also applies to the Egyptian railways. On the general map of North America, the large Noddawai river, flowing into James bay, is not laid down. The map of British Columbia is out of date, several important places, such as Rossland, being omitted, and the register is unsatisfactory.

The World. **Vivien de Saint Martin and Schrader.**

Atlas Universel de Géographie. Ouvrage commencé par M. Vivien de Saint Martin et continué par Fr. Schrader. Paris: Librarie Hachette et Cie. Sheets 7, 8, and 9. *Price* 2 *fr. each sheet.*

No. 7 is a political map of Europe; No. 8 is a physical map of France; No. 9 is a political map of France. Each map is accompanied by a short note, in which mention is made of the material from which it has been constructed.

CHARTS.

Admiralty Charts. **Hydrographic Department, Admiralty.**

Charts and Plans published by the Hydrographic Department, Admiralty, during November and December, 1897. *Presented by the Hydrographic Department, Admiralty.*

No.	Inches.	
2957 to 2960		Quarterly current charts for the Pacific ocean. 1*s.* each.
2017	m = 4·4	Ireland, south coast :—Dungarvan harbour. 1*s.* 6*d.*
434	m = 1·0 m = 0·47	North Atlantic ocean :—Gorringe or Gettysburg bank, Princess bank. 1*s.* 6*d.*
148	m = 8·9	Balearic islands :—Port Mahon (plan, port Fornells). 2*s.* 6*d.*
221	m = 6·0	Greece :—Ports Galaxidi and Itea. 2*s.* 6*d.*
1436	m = var.	Plans of anchorages in the Morea :—Port Ieraka, Monemvasia, Xyli bay, Vatika bay (reproduction). 1*s.* 6*d.*
1816	m = var.	Plans of anchorages in the gulf of Athens :—Town and ports Ægina, Port Epidavro (reproduction). 1*s.* 6*d.*
894	m = 3·0	Greece :—Salamis strait and Georgio channel. 1*s.* 6*d.*
1526	m = var.	Plans of anchorages in the Grecian archipelago :—Port Raphti, Port St. Nikolo, Port Mandri and Agastira bay, Mandri channel (reproduction). 1*s.* 6*d.*
1892	m = var.	Plans of anchorages in the Grecian archipelago :—Kara-agatch bay and lake Burughiul, Xeros islands, Port Baklar (reproduction). 1*s.* 6*d.*
1832	m = 4·7 m = 3·8	Plans of anchorages in the Grecian archipelago :—Port Trio, Port Naussa (reproduction). 1*s.* 6*d.*
1904	m = 7·8	Crete :—Megalo Kastron, or Candia. 1*s.* 6*d.*
2982	m = 8·0	Crete :—Anchorages on the south coast of Standia island. 1*s.* 6*d.*
1891	m = var.	Plans of anchorages in the Grecian archipelago :—Psara island, Strati island, Purnea bay, Kastro (reproduction). 1*s.* 6*d.*
1889	m = var.	Anchorages in the Grecian archipelago :—Cape Krio, with the ruins of Cnidus, town and road of Kos, Gumishlu, Bargylia creek, Levitha islands. 1*s.* 6*d.*
1635	m = var.	Plans of anchorages in the strait of Khios :—Port Egri-liman, Port Mersin, Port Sikia-Chesme, Spalmatori islands and port Kolokithia (reproduction). 1*s.* 6*d.*
1533	m = var.	Plans of anchorages in the gulf of Kos :—Shehir Oghlan islands, Port Gallipoli, Port Deremen, Yedi Atala (reproduction). 1*s.* 6*d.*
1614	m = 5·9	Falkland islands :—Stanley harbour. 1*s.* 6*d.*
408	m = var.	Harbours and anchorages in the Bahama islands :—Wide opening, Mira-porvos passage, Clarence harbour (reproduction). 1*s.* 6*d.*
409	m = var.	Harbours and anchorages in the Bahama islands :—Hawk's nest anchorage, Cockburn harbour, Ragged island harbour, Wax cay cut (reproduction.) 1*s.* 6*d.*
700	m = 1·0 m = 14·0	Plans of anchorages in Jamaica :—Negril bay and harbour, Hope bay anchorage. 1*s.* 6*d.*
2988	m = 2·6 m = 1·9	Gulf of Honduras :—Port Cortez, St. Thomas bight. 1*s.* 6*d.*
192	m = 1·75	Gulf of Mexico :—Galveston entrance. 1*s.* 6*d.*
2839	m = 1·8	North America, west coast :—Columbia river. 2*s.* 6*d.*
1228	m = 0·1	Africa, west coast :—Cape Spartel to Cape Ghir. 2*s.* 6*d.*
118	m = 0·52	India, west coast :—Kediwari mouth to Nirani creek. 2*s.* 6*d.*
43	m = 0·45	India, west coast :—Gulf of Kutch. 2*s.* 6*d.*
2986	m = 3·0	Andaman islands :—Port Cornwallis. 1*s.* 6*d.*
990	m = 3·9	Liu Kiu islands :—Naha roads. 2*s.* 6*d.*
1495	m = 0·13	Japan Aburatani bay to Ando Zaki, including Oki islands and Wakasa bay. 2*s.* 6*d.*
712	m = 2·0	Australia, west coast :—South Bejaling to Gascoyne road. 1*s.* 6*d.*
1437	m = 5·9	Australia, west coast :—Port Hedland. 2*s.* 6*d.*
2973	m = 2·9	Australia, south coast :—Esperance bay anchorage. 1*s.* 6*d.*
2920	m = 0·5	Australia, east coast :—Cape Direction to Cape Grenville. 2*s.* 6*d.*
384	m = 2·0	Plans in Tasmania :—Wedge bay. 1*s.* 6*d.*
2983	m = 2·0 m = 6·0	Ellice islands :—Funafuti atoll. Fongafale anchorage. 2*s.* 6*d.*
2992	m = 1·0 m = 3·0	South Pacific ocean :—Rotuma island, Foviung Emua anchorage. 1*s.* 6*d.*
17		Santa Cruz islands :—Plan added, Carlisle bay.

(*J. D. Potter, Agent*)

Charts Cancelled.

No.	Cancelled by	No.
2017 Dungarvan harbour.	New Chart. Dungarvan harbour	2017
434 Gorringe or Gettysburg bank.	New Chart. Gorringe or Gettysburg bank, Princess Alice bank	434
148 Port Mahon.	New Chart. Port Mahon	148
1600 Plan of Ports Salona and Galaxidi on this chart.	New Chart. Ports Galaxidi and Itea	221
1437 Xyli bay. 1436 Vatika bay and Cervi island. 1519 Port Ieraka Monemvasia. 1515 Towns and ports of Ægeria.	New Chart. Plans of anchorages in the Morea	1436
1816 Port Epidavro.	Ports of anchorages in the gulf of Athens	1816
894 Salamis strait and Georgio channel.	New Chart. Salamis strait and Georgio channel	894
215 Port Raphti. 1526 Mandri channel. 1512 Port Mandri and Agastira bay. 1516 Port St. Nikolo (Zea island). 2283 Xeros islands.	Plans of anchorages in the Grecian archipelago	1526
2288 Port Baklar. 1892 Kara-agatch bay and Lake Barughiul.	Plans of anchorages in the Grecian archipelago	1892
1835 Port Trio. 1832 Port Naussa.	New Chart. Plans of anchorages in the Grecian archipelago	1832
1904 Megalo Kastron.	New Chart. Megalo Kastron, or Candia	1904
2715 Plans of anchorages in Standia island on this sheet.	New Chart. Anchorages on the south coast of Standia island	2982
1524 Psara island. 1891 Strati island. 1660 Kastro. 1662 Purnea bay.	New Chart. Plan of anchorages in the Grecian archipelago	1891
1550 Town and road of Kos. 1889 Levitha islands. 1531 Gumishlu. Bargylia creek. 1553 Cape Krio	New Chart. Plans of anchorages in the Grecian archipelago	1889
1633 Spalmatori islands and Port Kola Kithia. 1635 Chesmeh. 1636 Port Egrilar, Port Mersin, Port Sikia. 1641 Port Egri-liman.	New Chart. Plans of anchorages in the strait of Khios	1635
1534 Port Gallipoli. 1535 Shehir, Oghlan islands. 1533 Port Deremen. 1536 Yedi Atala.	New Chart. Plans of anchorages in the gulf of Kos	1533
1614 Stanley harbour.	New Chart. Stanley harbour	1614
409 Hawk's Nest anchorage. 1472 Ragged island harbour. 1495 Wax cay cut. 2332 Cockburn harbour.	New Chart. Harbours and anchorages in the Bahama islands	409
408 Mira-por-vos passage. 2093 Clarence harbour. 2100 Wide opening.	New Chart. Harbours and anchorages in the Bahama islands	408
1786 Plans of Port Cortez and Omoa harbour to Port Cortez on this sheet.	New Chart. Port Cortez, St. Thomas bight	2988

No.		Cancelled by	No.
2831	Plan of Galveston entrance on this sheet.	New Chart. Galveston entrance	192
1227	Cape Spartel to Azimur.	New Chart.	
1228	Azimur to Santa Cruz.	Cape Spartel to Cape Ghir	1228
43	Gulf of Kutch.	New Chart. Gulf of Kutch	43
118	Kaha river to Godia creek.	New Chart. Kediwari mouth to Nirani creek	118
837	Port Cornwallis.	New Chart. Port Cornwallis	2986
990	Nafa-Kiang road.	New Chart. Naha roads	990
1055	Plan of Port Hedland on this sheet.	New Chart. Port Hedland	1437
1056	Plan of Gascoyne road on this sheet.	New Chart. South Bejaling to Gascoyne road	712
2920	Cape Direction to Cape Grenville.	New Chart. Cape Direction to Cape Grenville	2920
1079	Plan of Burnett harbour on this sheet.	New Chart. Plans in Tasmania	384
987	Plan of Rotuma island on this sheet.	New Chart. Rotuma island, etc.	2992
766	Plans of Funafuti and of Funafuti anchorage on this sheet.	New Chart. Funafuti atoll	2983

Charts that have received Important Corrections.

No. 1543, England, east coast:—Yarmouth and Lowestoft roads. 2397B, Scotland:—North and east coasts, etc. 1954, Scotland:—Thurso bay to the North Minch, etc. 262B, Channel islands:—Guernsey, Herm, and Serk. 2593, Germany:—Ameland to Jade river, etc. 189, Sicily:—Trapani to Marsala and Ægadean islands. 1233, Black sea:—Kustenji anchorage. 1774, Falkland islands:—Stanley harbour, with Ports William and Harriet. 267, North America, east coast:—Albemarle sound to Cape Fear. 2186, South America, east coast:—Pará river. 2001, South America, east coast:—Monte Video bay, etc. 1324, South America, east coast:—Rio de la Plata to Rio Negro. 1313, Chile:—Channels between Port de Ancud and Port Montt. 1923A, British Columbia:—Cape Caution to Port Simpson, etc. 570, British Columbia:—Quatsino sound, etc. 461, Africa, west coast:—Wari and Benin rivers and creeks. 795, Malacca strait:—Cape Rachado to Singapore. 2402, Straits of Durion, Suji, and Jombol. 2403, Singapore strait. 1680, Borneo:—Darvel bay. 2661A, China sea, northern portion. 1000, Siam:—Pulo Condore group. 1342, Cochin China:—Fan-rang bay to Tong King gulf. 2653, China:—Peiho or Peking river (sheet 1), from the entrance to Ko-ku. 1418, Australia, south coast:—Princess Royal harbour. 1700, Australia, west coast:—Gage roads. 624, Australia, south coast, Hobson bay and Yarra river to Melbourne. 2901, Solomon islands to Ellice islands. 845, Fiji islands:—Kandavu passage to Kowata island, etc. 2691, Fiji islands.
(*J. D. Potter, Agent.*)

North Pacific Ocean. **Lindenkohl.**

Spezifisches Gewicht ($S_4^{15°}$) des Oberflächenwassers im Nord-Östlichen Grossen Ozean. Gezeichnet von A. Lindenkohl. *Petermanns Geographische Mitteilungen*, Jahrgang 1897, Tafel 19. Gotha: Justus Perthes, 1897. *Presented by the Publisher.*

Pacific Ocean. **Hydrographic Department, Admiralty.**

Quarterly Current Charts for the Pacific Ocean. London: Published at the Admiralty, October 23, 1897, under the superintendence of Rear-Admiral Sir W. J. L. Wharton, K.C.B., F.R.S., Hydrographer. *Presented by the Hydrographer and the Meteorological Office.*

This atlas contains four charts, showing the currents of the Pacific Ocean for the months of January, April, July, and October. These charts have been constructed from a very large amount of material in the Meteorological Office, and afterwards generalized at the Hydrographic Department of the Admiralty by Commander H. E. Purey-Cust, R.N. In the notice accompanying the charts a list is given of the material employed, which includes many thousands of log-books, remark-books, and observations,

a considerable number of which have been supplied by foreign governments. The system on which these charts have been drawn is exceedingly simple, and when taken together with the instructions contained in the accompanying notice, should be easily understood by any navigator or student of physical geography.

United States Charts. **U.S. Hydrographic Office.**

Pilot Charts of the North Atlantic Ocean for January, 1898, and North Pacific Ocean for January and February, 1898. Published at the Hydrographic Office, Washington, D.C. *Presented by the U.S. Hydrographic Office.*

PHOTOGRAPHS.

Afghanistan. **Yate.**

Twenty-six Photographs of Southern Afghanistan, in the neighbourhood of the railway to Kandahar, and the Baluchistan boundary, taken by Major A. C. Yate, 1896-97. *Presented by Major A. C. Yate.*

As the following list will show, these photographs have been taken in a region to which considerable attention is turned at the present time :—

(1) Khattak sword dance; (2) Khattaks of the 2nd Baluch Battalion, doing feats of skill with the sword; (3) View of hills towards Kandahar (north-westward from Chaman), Sarbaldak hill and Amir's fort in foreground; (4) the Residency Quetta; (5) Corner of Chaman Bazar: Pathans shopping, itinerant cobbler in the foreground; (6) Tájik dog and bird fancier in Chaman Bazar; (7) Tame mottled polecat (*Plutorius saurmatisus*); (8) Camel plough: owner (a Nurzai Pathan) in centre, his son on his left, and a tramp from Kandahar on his right; (9) Bunérwál Malik, or headman; (10) Interior of caravansarai, Chaman; (11) Khattak company of the 2nd Baluchis at sword dance: native officers and musicians in centre; (12) Achakzai nomad camp; (13) Bullocks and plough: Pathans of the Pishin district: Achakzai in centre, and Kákars (father and son) on either side; (14) Back of commanding officer's bungalow at Chaman: laying in firewood for the winter; (15) Railway station at Chaman: tug of war, Pathan *v.* Panjabi Mohammedan (2nd) Baluchis; (16) View on rifle range: team practising for Quetta District Rifle Meeting for 1897; (17) Mir Allahdad Khan, Kurd, from the Bolán, and attendants: (18) Camp of Baluch horsedealers just arrived from Herat; Chaman, September, 1897; (19) Bullock plough; (20) Achakzai nomad camp: camel-hair cloth tents, larder (goat) on pole; (21) Baluch horsedealers; (22) Photograph at Octroi House at Chaman, taken by Lieut. Hawkes, of the 2nd Baluchis; (23) Khattak sword dance; (24) 88th Boundary Pillar of the Baluch-Afghan Boundary, 1½ mile north-west of Chaman, on the road to Kandahar; (25) Resort in Chaman of Kalandars, Fakirs, Hafizes, and other professional Mohammedan mendicants; (26) Loralai cantonment.

Beira Railway. **Good.**

Seventy-three Photographs of the Beira railway and neighbourhood, taken by H. Good, Esq., 1897. *Presented by H. Good, Esq.*

This set of photographs contains views of the Beira railway and the country through which it passes for the whole of its present length. The views have been well chosen to convey an idea of the general scenery, and form a valuable addition to the Society's collection.

(1) Old ferry, Beira; (2) Roman Catholic church, Beira; (3) Creek on north side of Beira; (4) Portion of Beira in 1893; (5) Beira from lighthouse; (6) Beira lighthouse and meteorological station; (7) Lighthouse near Beira; (8) Main street in Beira; (9) Beira railway hospital; (10) Native kraal near Beira; (11) 10-mile siding; (12) 7 miles from Beira; (13) 25 miles from Beira; (14) Native kraals at Jabas; (15) Orange trees at Jabas; (16) Type of natives; (17) Maintenance Engineer's house at Fontesvilla; (18) The first camp in Fontesvilla; (19) The old landing station at Fontesvilla; (20) Fontesvilla: Pungwe river to the left; (21) 71 miles from Beira: doctor's camp near Cheruva hills; (22) About 72 miles from Beira; (23) 72 miles from Beira (in forest at foot of Liluvu hills); (24) About 74 miles from Beira; (25) About 75 miles from Beira; (26) About 76 miles from Beira; (27) 83 miles from Beira; (28) About 84 miles from Beira; (29) The plate-laying gang at 88 miles from Beira; (30) About 92 miles from Beira; (31) About 93 miles from Beira; (32) About 97 miles from Beira; (33) Reserving-station at 98 miles from Beira; (34) Reserving-station 98 miles from Beira and 62 from Fontesvilla; (35) Railway camp at Amatongas; (36) Railway camp about 100 miles from Beira; (37) Earthworks at 102 miles from Beira: (38) At about 107 miles from Beira; (39) Mudicherri river at 108 miles from Beira; (40) At 108 miles from Beira; (41) About 108 miles from Beira; (42) 108½ miles from Beira; (43) Hoboken: main street; (44) Hoboken back street (111 miles from Beira);

(45) Hoboken (111 miles from Beira); (46) At 111 miles from Beira; (47) Camp at 111 miles from Beira; (48) Railway camp at 111 miles from Beira; (49) About 112 miles from Beira; (50) At 112 miles from Beira; (51) About 113 miles from Beira; (52) About 113 miles from Beira; (53) At 113½ miles from Beira; (54) About 115 miles from Beira; (55) Manangibas station, engine shed, 116 miles from Beira; (56) About 117 miles from Beira; (57) At 117 miles from Beira; (58) In forest about 117 miles from Beira; (59) In forest at 117 miles from Beira; (60) Police camp, Old Umtali; (61) "Royal Hotel," Umtali: coach leaving for Salisbury; (62) "Richmond" store, 4 miles from Umtali (New); (63) Coach leaving Chimoio with team of oxen; (64) Chimoio, with granite mountain in distance; (65) Chimoio; (66) Store and camp on main transport road between Massi-Kessi and New Umtali (5 miles from Massi-Kessi); (67) Massi-Kessi, Vomba mountain in distance; (68) Temporary bridge near Massi-Kessi; (69) An adit at the "Guy Fawkes" mine, near Massi-Kessi; (70) Massi-Kessi, temporary station; (71) Remains of fort at Old Massi-Kessi; (72) Native huts; (73) Home from the hunting trip.

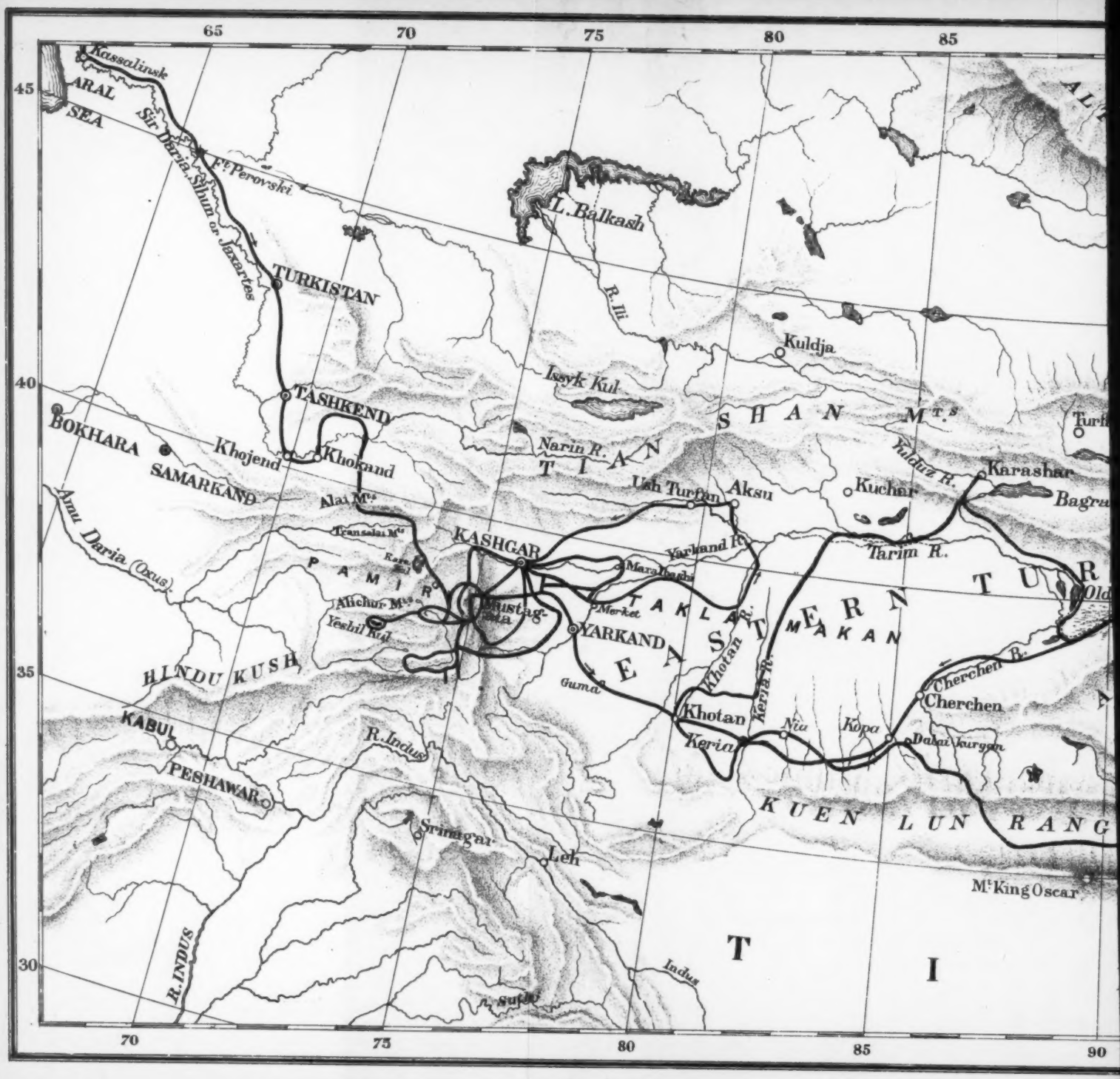
Kashmir. **Hastings.**

Forty-two photographs of the neighbourhood of Gilgit, Chilas, Nanga Parbat, etc., taken by G. Hastings, Esq. *Presented by G. Hastings, Esq.*

This is a remarkably good set of photographs, and contains some striking examples of the grand mountain scenery of Kashmir.

(1) View of Nanga Parbat (26,620 feet) from Bunji (4600 feet); distance, 36 miles; time, sunrise. (2) Nanga Parbat, from Bunji; time, sunset. (3) Nanga Parbat, the north-west face, taken from the Diamirai Mullah (runs north-west into the Indus). The bank in front is the left lateral moraine of glacier, here from 11,000 to 12,000 feet. (4) Bridge over Indus. (5) River cliff above the Gilgit stream: view looking up the Bagrot nullah. (6) Baltit, the capital of Hunza. (7) Peaks over Nagar, 23,500 feet high. (8) View of the Rupal valley on south side of Nanga Parbat, taken from near to the Tarshing glacier. (9) Nanga Parbat, 26,620 feet, as seen from the south-west, taken *en route* to the Mazeno pass. (10) Hunza valley: view from Nilt, looking across Hunza river towards Maiun. (11) Hunza: the golden Peri and Barpu glacier. (12) Hunza: village shrine. (13) Bridge over the Indus, 6 miles above Bunji. (14) View of Nanga Parbat from the Bunji plain, 41 miles from summit; time, sunrise. (15) View up the Gilgit nullah from the Bunji plain. (16) Tragbal Choki. (17) View of Nanga Parbat and the Gonalo peak from the Indus valley 2 miles below Rhamghat, the junction of the Astor and Indus rivers. (18) Bridge over the Kishengunga river above Gurais. (19) Tragbal Choki, on the Gilgit road. (20) Wular lake from Sonerwain, Bandipore. (21) Nanga Parbat as seen from the Kamri pass, 13,300 feet; distance to summit, 35 miles. (22) Group of coolies from the villages of Tarshing, Zaipuri, and Chorit. (23) A Hunza village, with shrine outside. (24) The Rakiote glacier and morainic cliff of right side of glacier; large forest grows on the outer slope of the lateral moraines. (25) Goatherds hut, and corral in the Lubar valley below the Mazeno pass (north side). (26) Group of headmen from the Bunar villages (Chilas). (27) View up the Indus valley from Chilas fort. (28) The gate of Chilas fort. (29) Bastion of Chilas fort. (30) Bagolah nullah below Chilas fort. (31) Nanga Parbat from the north-west, taken from the Diamirai nullah. The bank on left is the outer slope of the lateral moraine. (32) The Diamirai peak (19,000 feet), the end peak of the western ridge of Nanga Parbat, taken from the right-hand side of the Diamirai nullah, looking south. (33) View over Bandipore nullah, looking on to the Wular lake, Kashmir. (34) Post of Lechir, 6 miles below Ramgat in the Indus valley, site of temporary dam caused by slipping of hillside in 1841, which occasioned immense flood down the Indus valley. (35) Indus river near Bunar post, 15 miles above Chilas. (36) Chilas fort, with main gate and view over Indus valley of hillside on right bank. (37–40) Panorama in four sections of the north face of the west ridge of Nanga Parbat. (41–42) Panorama in two sections of Nanga Parbat and the Gonalo peak.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.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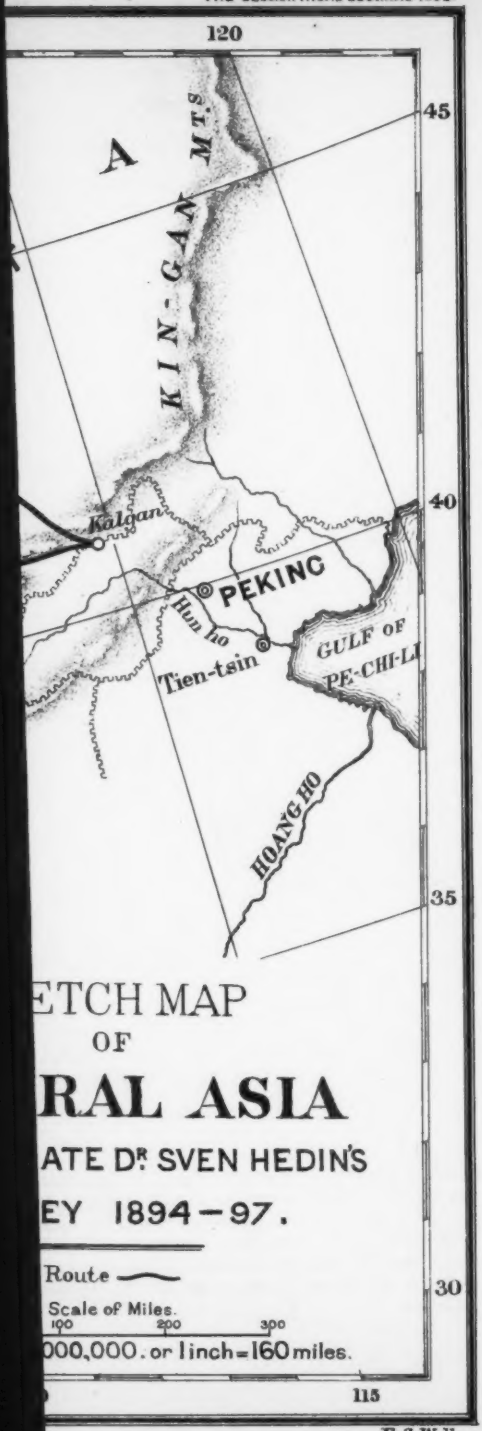

ETCH MAP
OF
RAL ASIA
ATE Dr SVEN HEDIN'S
EY 1894–97.

Route

Scale of Miles.
100 200 300
000,000. or 1 inch = 160 miles.

F.S. Weller.

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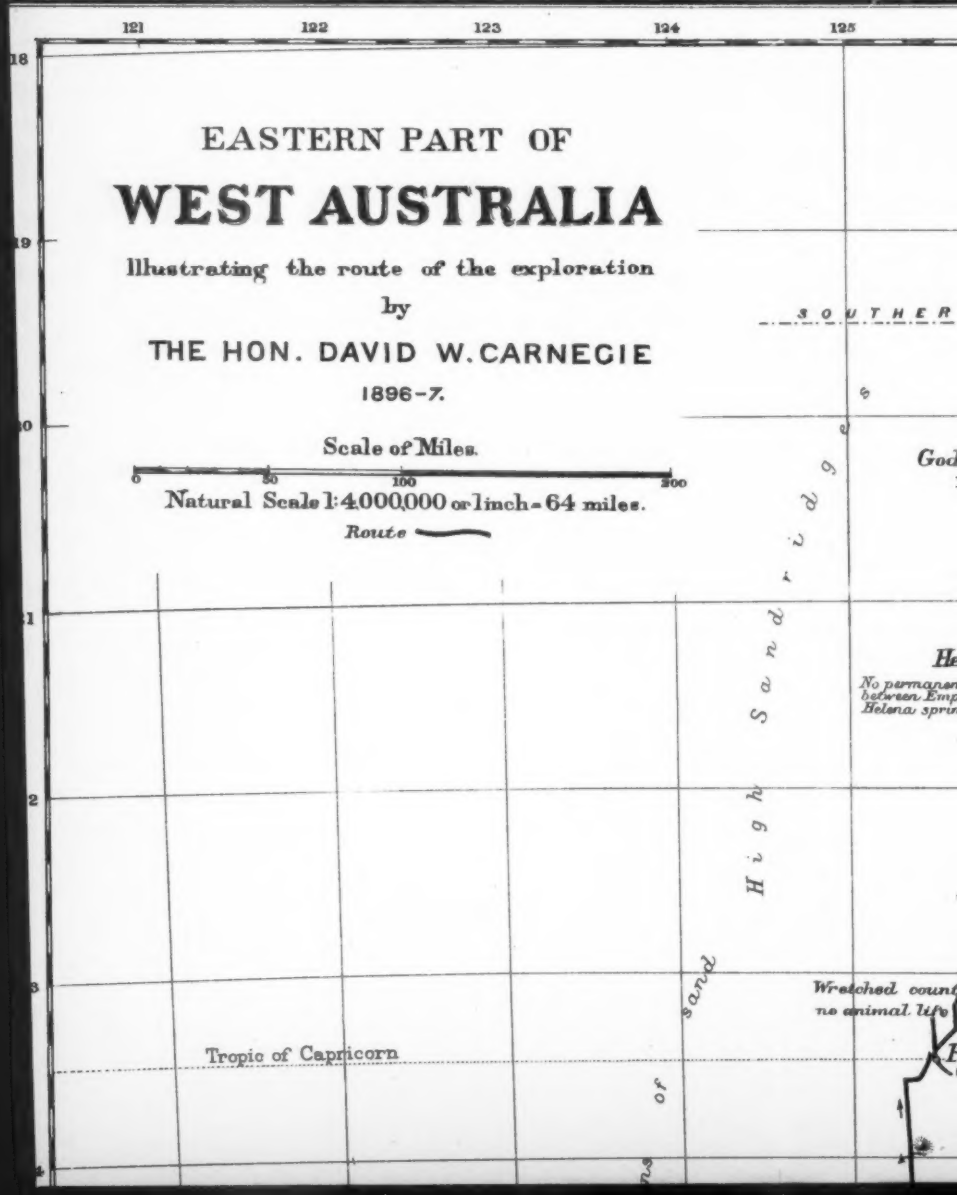
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EASTERN PART OF
WEST AUSTRALIA
Illustrating the route of the exploration
by
THE HON. DAVID W. CARNECIE
1896-7.
Scale of Miles.
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Mueller Range
Margaret R.
Albert Edward Range
Mary R.
Denison Plain
Mt. Hawick
Mt. Clintock Range
Christmas Creek
Sandstone Bluff
Edge of Desert
Wolfe R.
Stuart Creek
Denison's Downs (Homestead)
Mt. Bannerman
ERN BOUNDARY OF KIMBERLEY
Jew's Well
Lagoon
Sandhills
Mt. Mueller
Sandhills
Scrub
Godfrey's Tank
Mt. Elgin
Mt. Romilly
Salt Sea
Mt. Wilson
Gregory's farthest 1856
Mt. Elphinstone
Pt. Massie
Warburton 1873
Sandhills
Mt. Fothringham
High Range
Forebank Hills
Erica Ranges
Bluff
Native Well
Pool
Helena Springs
Stansmore Range
Salt Lake (Lake White)?
Native Well
Low Hills
Native Well
Sandstone Bluff?
Spinifex and Gums
Wilson Cliffs
Dwarf Well
Family Well
Undulating country
Bluff
(dry) Well
Mt. Webb
No permanent water seen between Stuart Cr. and Earlistan Creek
Winnecke Hills
Victoria 1889
Patience Well
(30 feet deep)
L. Mac Donald
Davenport Hills
Rockhole
Lake
Rock

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